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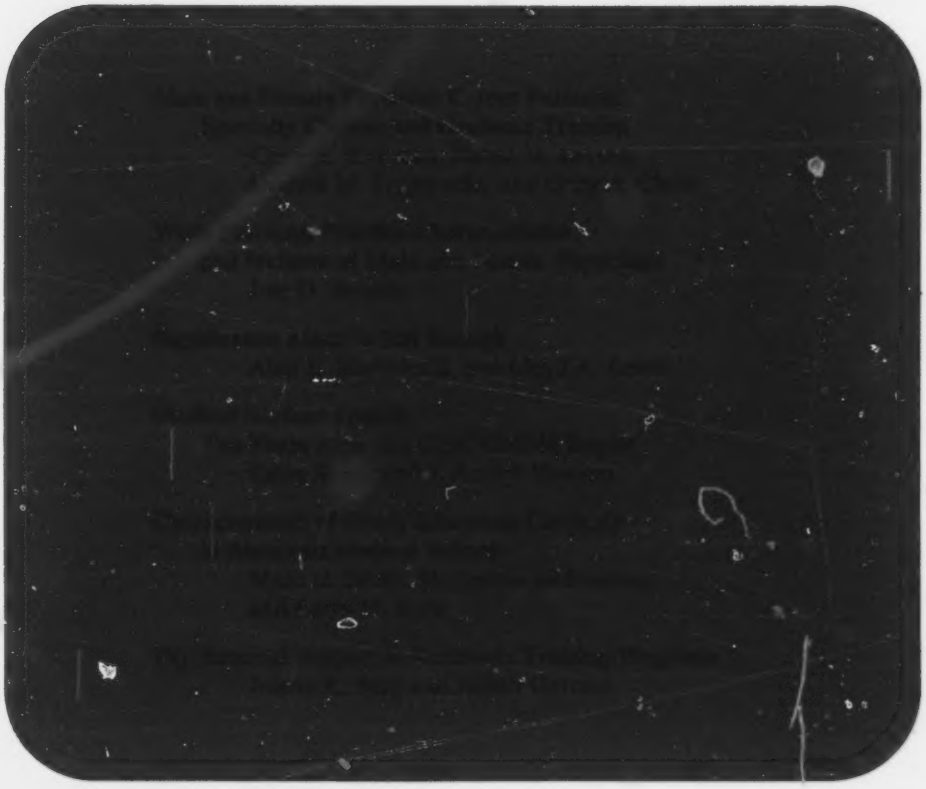

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Male and Female Physician Career Patterns: Specialty Choices and Graduate Training

Carol S. Weisman, Ph.D., David M. Levine, M.D., Sc.D., Donald M. Steinwachs, Ph.D., and Gary A. Chase, Ph.D.

Abstract—During the decade of the seventies the proportion of entering U.S. medical school classes consisting of women increased from 9 to 25 percent. National data on 74,265 physicians from seven graduation cohorts (1970 to 1976) reveal that this phenomenon has resulted in a trend toward convergence of male and female career patterns in several important areas: specialty choice during graduate medical education, patterns of switching specialties and subspecialization, and duration of graduate medical training. In addition, whereas both sexes show an increased tendency to select general internal medicine and family practice, the lower rate at which women subspecialize within pediatrics and the increasing rate at which they select obstetrics/gynecology suggest a shifting orientation toward primary care among women.

Women entering U.S. medical schools have increased from less than 10 percent of the class a decade ago to 25 percent of current entering classes (Table 1). The increasing proportion of women raises several questions about the future profile of the medical profession, including issues of specialty distribution and productivity. Several authors have projected changes in the practice of medicine due to the divergent behavior of women as they progress through medical education and into practice. This study reveals that, on the contrary, as the proportion of women physicians increases, the behavior of men and women tends to converge to the prevailing norms of the profession.

The conventional expectation that increasing numbers of women will significantly alter the character of the medical profession is based on observations of sex differences in specialty choices and patterns of practice among physicians of the past. Historically, women physicians in the United States have tended to be over represented in pediatrics and psychiatry and notably underrepresented in surgery and the surgical subspecialties (4). If these patterns were to continue as more women enter the physician pool, one might expect a greater proportion of primary care providers and proportionately fewer surgeons. However, recent data pertaining to specialty preferences and choices in various samples suggest the diminution of sex dif-

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TABLE 1

Enrollment of Women in U.S. Medical Schools, 1968–1978

First-Year Class	No. of Women Enrolled	Percent of Total Class	Percent Increase from Previous Year
1968–69*	887	9.0	—
1969–70*	948	9.1	6.88
1970–71*	1,256	11.1	32.49
1971–72*	1,693	13.7	34.79
1972–73*	2,284	16.8	34.91
1973–74†	2,790	19.7	22.15
1974–75†	3,275	22.2	17.38
1975–76†	3,647	23.8	11.36
1976–77†	3,858	24.7	5.78
1977–78†	4,130	25.6	7.05
1978–79‡	4,162	25.2	0.77

* Source: W. F. Dube (1).

† Source: M. F. Ackerman (2).

‡ Source: D. G. Johnson and T. L. Gordon (3).

ferences (5, 6). To date, no comprehensive analysis of trends in specialty selection among men and women is available.

On the issue of productivity, women physicians in the past have been observed to have higher inactivity rates than men, leave residency training more often, and practice medicine for fewer hours per week and for fewer years (7–9). Recent investigations, however, suggest that since the activity levels of male and female physicians are converging, the experience of the past should not be used as the basis for projections of future physician productivity or for planning purposes (5, 10).

A theoretical basis for expecting convergence of male and female career patterns among physicians exists in the sociological literature. Kanter (11) has argued that shifts in the proportional representation of social groups within organizations alter the behavior of members. Specifically, she observed the behavior of men and women in professional and managerial roles within a corporation and concluded that when women constitute a small minority, they tend to be highly differentiated as "tokens" and encapsulated in limited roles. As their proportion increases, women tend to be integrated into the group as members in their own right.

Kanter describes four types of groups in which the relative numbers of men and women result in different social contexts and patterns of behavior: "uniform groups," consisting of only one sex, a socially undifferentiated group; "skewed groups," with a large preponderance of one sex (for example, 85 percent men and 15 percent women); "tilted groups," with less skewed distributions but still a majority and minority evident (for example, 65 percent men and 35 percent women); and "balanced groups," in which the sexes are represented in approximately equal proportions.

In skewed groups the numerically dominant subgroup tends to control the culture and social interactions. Consequently, tokens tend to be behaviorally differentiated from the dominant subgroup. In tilted groups the minority becomes a more powerful constituency as its greater size affords the opportunity to influence the group. Members of the minority begin to develop as much behavioral variation among themselves as between them and the majority. Finally, in balanced groups individuals tend not to be differentiated on the basis of identification with the subgroup alone.

The current situation in the medical profession appears to reflect a transition from a skewed to a tilted system. Women in medicine are no longer tokens but have become a sizable minority in recent medical school cohorts. Their greater visibility and ability to influence the profession or the medical school culture would be expected to reduce overt or covert discriminatory practices and to expose them to opportunities and incentives more similar to that of men. The behavior of men and women, therefore, would tend to become more similar.

Methods

The present study is designed to test the convergence hypothesis using data on seven cohorts of U.S. medical school graduates for the years 1970 through 1976, a period in which the proportion of graduating classes that was female nearly doubled, rising from 9 to 16 percent. During the decade of the seventies the context in which these graduates were being educated was undergoing the transition from a skewed to tilted system, as described earlier.

The data for the study were obtained from the American Medical Association. The data set combines two types of information: self-reported demographic, educational, and practice data from surveys of Physicians' Professional Activities and data supplied by hospitals reporting all physicians enrolled in approved residency programs on a yearly basis. Data are available for all approved residency programs and all 74,265 U.S. medical graduates entering graduate medical education between 1970 and 1976.

The information was compiled up to and including the 1977–78 academic year and includes the specialty area of each year of graduate medical education, the frequency of specialty migration (through switching or subspecializing), and several indicators of the timing with which individuals complete graduate medical education. The latter include the total number of years in graduate medical education (GME) and the number and duration of gaps in training. Examination of sex differences in these variables across seven cohorts will serve as a test of the convergence hypothesis.

Findings

Choice of specialty for the first year of graduate medical education is the first area in which to compare men and women across the seven cohorts. In 1974 the designation of the first year of GME changed from "internship" to either categorical designations by specialty area or "flexible internship." To facilitate comparisons across the cohorts, all pre-1974 internships have been classified into their categorical areas whenever possible and designated as flexible internships in the remaining cases.

Table 2 shows the percentages of men and women entering each specialty in the first year of GME. Among 1970 graduates, the most frequently selected area (other than flexible internship) among men was internal medicine and the most frequently selected among women was pediatrics. By 1976 both men and women were selecting internal medicine most often. Overall convergence in Table 2 was tested using a chi-square statistic, and the convergence hypothesis was upheld.

To perform the formal statistical test of convergence of the male and female distributions, the specialties were grouped into nine areas by combining source specialties with their subspecialties, specialties sharing the same certifying boards (psychiatry and neurology), and three infrequently chosen specialties with similar practice patterns (anesthesiology, pathology, and radiology). A chi-square statistic with 8 degrees of freedom was computed for the two by nine tables of sex by specialty area for each of the seven cohorts. The tendency to convergence as defined here would be supported by a decrease in the chi-square statistic, corrected for changes in population size, over time. Over the period 1970–1976, there was a consistent linear decrease in the values of the statistic as a function of time ($r = -.87$).

Figure 1 illustrates the convergence for those entering specialties with the largest number of incumbents. The graph displays trends in the ratio of the proportion of women to men entering a particular specialty. If, over time, women's selections

TABLE 2

Specialty of First Year of Graduate Medical Education, by Sex and Cohort*

Specialty	Percentage of Subjects						
	1970 (*N* = 705/ 7,527)†	1971 (*N* = 797/ 7,922)	1972 (*N* = 834/ 8,541)	1973 (*N* = 953/ 9,751)	1974 (*N* = 1,289/ 10,349)	1975 (*N* = 1,691/ 10,665)	1976 (*N* = 2,132/ 11,109)
Internal Medicine							
Men	27.49	29.79	32.61	33.26	32.95	34.74	34.38
Women	21.28	23.46	22.54	25.18	31.11	32.82	29.08
Pediatrics							
Men	7.72	8.08	8.14	7.93	7.90	8.26	7.73
Women	28.37	28.23	27.58	25.60	20.40	19.34	19.37
Family practice/ general practice							
Men	1.57	2.27	2.63	5.52	9.34	11.53	12.22
Women	.99	1.00	1.44	5.46	6.28	7.69	8.58
Obstetrics/ gynecology							
Men	1.34	2.21	3.54	4.02	4.36	5.05	4.69
Women	1.13	1.50	2.99	2.62	4.03	6.62	6.33
General surgery							
Men	13.55	14.55	14.75	15.35	15.21	14.96	13.38
Women	3.69	4.39	5.76	6.61	6.83	6.80	7.32
Surgical sub-specialties							
Men	.21	.18	.46	.82	.65	.8	.54
Women	.14	.00	.24	.21	.46	.53	.33
Psychiatry							
Men	1.45	3.13	3.14	3.04	3.05	3.77	4.21
Women	3.40	4.77	5.16	5.25	4.65	5.26	5.68
Neurology							
Men	.09	.11	.13	.17	.09	.42	.41
Women	.28	.00	.24	.63	.08	.41	.33
Dermatology							
Men	.03	.05	.06	.08	.04	.06	.00
Women	.14	.12	.12	.10	.08	.00	.00
Anesthesiology							
Men	.08	.04	.06	.35	.39	.08	.04
Women	.56	.12	.00	.52	.70	.18	.00
Pathology							
Men	1.69	1.98	2.07	1.91	2.23	2.43	2.38
Women	1.70	3.51	2.52	1.99	3.18	2.78	2.95
Radiology							
Men	.16	.11	.28	.47	.49	.14	.08
Women	.14	.12	.60	.73	.93	.06	.14
Flexible internship‡							
Men	44.21	37.11	30.96	25.55	20.86	14.16	14.84
Women	37.59	32.37	28.78	22.98	18.08	13.66	12.89
Other or unknown							
Men	.41	.35	1.18	1.50	2.39	3.48	5.08
Women	.57	.38	2.04	2.10	3.18	3.84	6.99

* Cohorts are based on year of medical school graduation.

† *N* = number of women/men within each cohort. Percentages total to 100 within each sex and cohort.

‡ Designation of the first year of graduate medical education changed in 1974 from "internship" to either categorical designation by specialty area or "flexible internship." All internships noted here are flexible. Categorical internships prior to 1974 have been coded in the specialty areas.

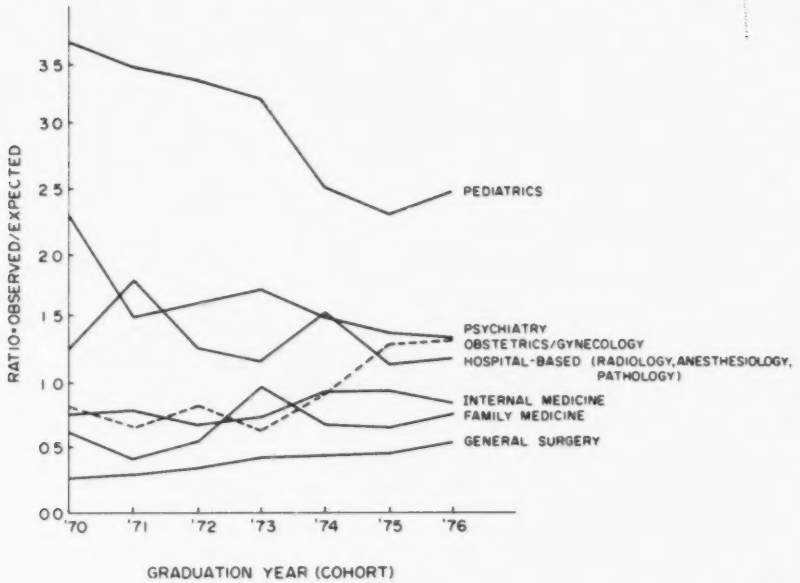

FIGURE 1

Trends in the ratio of observed to expected proportion of women in selected specialties, first year of graduate medical education. (Observed = proportion of all women in specialty; expected = proportion of all men in specialty.) Only one-specialty, obstetrics/gynecology, shows a reversal in preference by sex. It is indicated by a broken line.

tended to conform to the norms of the profession, the ratios would approach one, and the lines on the graph would tend to converge to one.

The figure exhibits a trend toward convergence. In particular, the specialties which women entered more frequently than men in 1970 (pediatrics and psychiatry) show substantial declines toward a ratio of one, and the specialties chosen less frequently by women than men (general surgery, family medicine, and internal medicine) show a gradual increase toward one.

Only one specialty in Figure 1 shows a reversal in preference by sex. In obstetrics/gynecology women were more likely than men to enter in 1975 and 1976, but this was not the case for earlier cohorts. Further, in the 1975 and 1976 cohorts women comprise a larger proportion of all entering residents in obstetrics/gynecology than would be expected based on their proportion in the cohort as a whole. Women were 17.2 percent of all obstetrics/gynecology residents in 1975 and 20.6 percent in 1976; in the same year they were 13.7 percent and 16.1 percent of all first-year residents.

LAST SPECIALTY

"Last specialty" is defined as the specialty of the last known year of GME for each individual. Whereas the last known GME specialty is more likely to represent individuals' actual areas of practice then is the first-year specialty, subsequent changes in specialty area may occur. Table 3 shows the percentages of men and women in each specialty area during their last known year of GME and also shows the percentages within each cohort who were still in residencies as of the last year of data collection

TABLE 3

Specialty of Last Year of Graduate Medical Education, by Sex and Cohort*

Specialty	Percentage of Subjects						
	1970 (12.45/ (6.10)‡	1971 (17.55/ 8.91)‡	1972 (24.06/ 16.79)‡	1973 (37.58/ 31.48)‡	1974 (60.60/ 60.51)‡	1975+ (84.84/ 82.79)‡	1976† (92.88/ 91.32)‡
Internal medicine							
Men	19.77	18.98	20.30	21.87	22.9o	29.26	31.50
Women	18.86	20.08	15.59	17.21	21.64	26.73	26.78
Pediatrics							
Men	7.20	6.93	6.82	6.80	6.99	7.68	7.59
Women	23.40	25.72	24.10	22.35	17.38	18.80	19.18
Internal medicine subspecialties§							
Men	7.98	9.81	11.62	10.72	7.87	1.51	.10
Women	5.53	6.90	9.95	9.13	7.22	2.13	.94
Pediatric subspecialties							
Men	48	.40	.42	.45	.33	.08	.00
Women	1.13	1.25	1.56	1.36	.54	.06	.00
Family Medicine							
Men	3.23	4.52	5.97	7.74	10.63	11.80	12.30
Women	1.98	2.01	3.96	5.67	7.45	7.92	8.77
Obstetrics/ gynecology							
Men	5.65	5.63	6.05	5.73	6.12	6.28	5.41
Women	2.69	4.39	5.52	4.41	6.67	7.98	7.36
Surgery							
Men	7.21	8.22	7.89	8.72	9.03	9.73	10.93
Women	2.98	2.63	4.20	5.14	5.20	5.08	6.19
Surgical subspecialties							
Men	17.91	16.17	14.10	13.36	11.76	10.21	6.22
Women	3.55	3.51	4.69	4.20	4.27	4.02	2.11
Psychiatry							
Men	6.76	7.06	5.84	5.47	4.96	4.88	4.91
Women	11.49	9.54	7.79	7.34	8.07	7.04	7.41
Neurology							
Men	2.02	2.32	2.18	2.01	1.58	1.72	1.20
Women	2.69	1.50	2.16	2.10	1.78	1.89	.98
Anesthesiology							
Men	2.90	2.81	2.66	2.64	2.83	2.80	1.77
Women	5.67	3.39	2.64	4.09	2.79	2.72	1.36
Pathology							
Men	2.80	3.21	2.98	2.54	2.80	2.66	2.63
Women	3.69	4.77	2.64	2.31	3.72	3.67	3.47
Radiology							
Men	7.28	5.93	4.48	3.80	3.58	3.54	3.39
Women	6.81	6.15	4.56	4.93	3.96	3.49	3.33
Other hospital based specialties**							
Men	.28	.20	.27	.15	.09	.03	.00
Women	.12	.12	.72	.10	.16	.00	.00
Flexible internship††							
Men	6.84	5.83	5.65	4.97	4.56	3.13	5.39
Women	4.54	4.39	5.39	4.09	3.88	3.13	3.99

TABLE 3—*continued*

Specialty	Percentage of Subjects						
	1970 (12.45/ (6.10)‡	1971 (17.55/ 8.91)‡	1972 (24.06/ 16.79)‡	1973 (37.58/ 31.48)‡	1974 (60.60/ 60.51)‡	1975† (84.84/ 82.79)‡	1976† (92.88/ 91.32)‡
Other or unknown							
Men	1.85	1.97	2.75	2.99	3.94	4.68	6.06
Women	4.68	3.64	4.56	5.56	5.28	5.32	8.11

* Cohorts are based on year of graduation from medical school. For total Ns, see Table 2.

† Members of the 1975 and 1976 cohorts may not have entered their final areas by the time these data were compiled. Low subspecialization rates and high proportions still in residency compared with earlier cohorts suggest data for the 1975 and 1976 cohorts do not reflect actual last year of GME.

‡ Proportion of men/women in residency as of 1977–78.

§ Includes dermatology.

** Includes primarily subspecialties of radiology and pathology.

†† See note for Table 2.

(1977–78). Specialty data for the 1975 and 1976 cohorts should be interpreted with caution, since the high proportions still in residencies and the lower rates of subspecialization compared with earlier cohorts suggest that last known specialty may not correspond to last GME specialty. This does not affect the test of convergence of male and female distributions, however.

Male members of the 1970 cohort were most likely to conclude their graduate medical educations in internal medicine or the surgical subspecialties (excluding obstetrics/gynecology). Women were most likely to be in pediatrics or internal medicine. In the 1974 cohort, the most recent cohort for which data on the last year of training are available, these choices were still the most likely, although internal medicine replaced pediatrics as the most frequent choice among women. Among men, family medicine was selected nearly as often as the surgical subspecialties in the 1974 cohort. The interim data for the 1975 and 1976 cohorts show family medicine supplanting the surgical specialties as the second most popular specialty among men and also increasing in popularity among women. Overall convergence in Table 3 was tested using a chi-square statistic, and the convergence hypothesis was upheld.

The chi-square statistic was computed in the same manner described earlier, except that 11 specialty areas were defined. In the last GME year there were sufficient numbers in the subspecialties of both internal medicine and surgery to warrant their inclusion as separate categories. The convergence hypothesis is upheld, as the chi-square statistic, corrected for changes in population size, decreased as a function of time over the 1970-1974 period ($r = -.89$).

As in the trends associated with specialty of the first GME year, the ratios of the proportion of women to men in the specialties of the last year of GME tend to converge to one over time. Pediatrics shows a dramatic decline toward one, while family medicine, surgery, and the surgical subspecialties show a gradual increase toward one. Again, obstetrics/gynecology reveals a transformation from a specialty in which men were more likely to conclude GME in the 1970 through 1973 cohorts to one in which women were more likely to conclude GME in the 1974 and later cohorts.

Thus, the distributions of men and women across specialties are becoming more similar, but sex differences in specialty selection still exist. Viewing the specialty of the last GME year for the 1974 cohort, it is possible to identify those specialties in which women were overrepresented as compared with their proportion

in the 1974 cohort as a whole. In the 1974 cohort women were 11 percent of the population but were overrepresented in pediatrics (where they were 24 percent of all residents), pediatric subspecialties, psychiatry, neurology, obstetrics/gynecology, and the hospital-based specialties (particularly pathology and radiology). Conversely, women were notably underrepresented in surgery (where they were 7 percent of all residents), the surgical subspecialties, and family medicine. Despite the trend toward convergence in the patterns of specialty selection by sex, there remain several areas in which women constitute an unexpectedly high or low proportion of residents.

SPECIALTY MIGRATION

Individuals frequently change specialties during GME, either by switching to an unrelated specialty or by subspecializing. Switching may result from dissatisfaction with the original specialty choice or assignment and may contribute to less efficient completion of GME. Subspecialization may also prolong GME, as certain subspecialties require longer training. The present data reflect patterns of specialty migration by sex for the cohorts observed.

Specialty switching is most likely to occur between the first and second GME years. For purposes of this analysis a "switch" is defined as a change of specialty to either an unknown specialty or to one that is not a subspecialty of the entering specialty. (Changes after "flexible internships" are excluded.) One caveat is in order: switching from internal medicine should be interpreted with caution, as some residents use the first year in internal medicine as a general clinical year from which to branch to any number of other areas.

Table 4 presents data revealing the frequency of switching between the first and second years of GME. Overall, approximately 20 percent of all residents switch specialties, although the frequency of switching among men is declining over time. The data show that women switch slightly more frequently than men, with the smallest sex difference occurring in pediatrics. Women are consistently more likely than men to switch from general surgery. Further, women are more likely than men to use internal medicine as a first clinical year and then switch to another area in the second year. No consistent pattern of change in switching by sex emerges from these data. In only two specialties (psychiatry and pediatrics) does it appear that male and female switch rates are tending to converge.

Subspecialization rates by sex indicate whether one sex is more likely to produce subspecialists as opposed to generalists. Since Table 2 has shown that men and women enter the various "source" specialties with different probabilities, it is most informative to examine subspecialization with reference to the original specialty. Table 5 presents such a view of subspecialization, showing the proportions of men and women, by cohort, who subspecialized within each of the areas of internal medicine, general surgery, and pediatrics between the first and last years of GME. (The 1975 and 1976 cohorts are excluded from the table since subspecialization data would be incomplete and possibly misleading for these more recent cohorts.)

For each of the areas examined in Table 5, women are generally less likely than men to subspecialize. Even though women are more likely than men to enter pediatrics (Table 2), they enter pediatric subspecialties less often than men in three out of five cohorts examined. However, Table 5 reveals that the gap between male and female subspecialization rates narrowed during the study period in the area of internal medicine, although not in pediatrics or surgery. (Convergence of subspe-

TABLE 4

Specialty Switching Between Years One and Two, by Sex and Cohort*

Year One Specialty	Percentage of Subjects					
	1970	1971	1972	1973	1974	1975
Internal medicine						
Men	30.14	30.04	23.12	20.51	21.13	20.67
Women	29.08	29.15	26.75	23.77	25.27	25.50
Pediatrics						
Men	16.55	16.59	13.69	10.14	8.55	11.55
Women	20.00	15.07	8.60	10.09	10.98	10.06
Family medicine						
Men	50.89	32.05	8.56	10.62	9.53	9.43
Women	66.67	71.43	0.00	24.49	11.59	12.39
Obstetrics/gynecology						
Men	9.57	12.50	7.34	8.51	7.13	10.37
Women	50.00	0.00	0.00	4.17	10.42	15.69
General surgery						
Men	13.69	9.74	8.90	9.98	10.53	10.77
Women	26.09	32.36	10.64	16.66	15.48	21.71
Psychiatry						
Men	2.91	2.15	2.39	6.64	4.98	7.37
Women	0.00	8.33	9.52	6.38	5.08	11.76
Pathology						
Men	11.97	12.67	10.06	12.15	10.60	14.52
Women	16.67	25.93	10.00	26.32	8.11	19.57
All specialties†						
Men	23.30	21.21	17.41	16.25	17.07	18.58
Women	23.74	22.50	16.73	17.98	19.33	22.08

* Within each graduation cohort, the proportion of men and women in each year-one specialty area who switched to an unrelated area in year two. "Unrelated areas" are defined as any specialty which is not a subspecialty of the Year One specialty. The 1976 cohort is excluded from this table since the data on their second year of graduate medical education contained substantial missing information.

† Excludes those in flexible internships in year one, since virtually all of those individuals switch between years one and two.

cialization rates of men and women in internal medicine, pediatrics, and surgery was examined by calculating the sex difference in subspecialization rates and inspecting the data for trends. This difference tended strongly toward zero in internal medicine but did not decrease consistently in pediatrics or surgery.)

YEARS/GAPS IN TRAINING

The total number of years spent in graduate medical education and the frequency and duration of gaps in residency training reflect individuals' efficiency in completing GME as well as their availability for full-time practice. Table 6 displays data on the average number of years men and women spend in GME, the proportion of persons with gaps in residency training, and the average number of months spent in gaps. The precise nature of the gaps and the reasons for suspension of residency training are not discernible from these data.

The patterns in Table 6 show close similarity between male and female physicians. In terms of total known length of training, both sexes had spent slightly more than three years, on average, in GME during the period of observation.

TABLE 5

Subspecialization During Graduate Medical Education, by Sex and Cohort*

Year One Specialty	Percentage of Subjects				
	1970	1971	1972	1973	1974
Internal medicine†					
Men	18.08	22.25	25.77	24.88	18.65
Women	8.67	13.37	22.99	19.67	14.71
Pediatrics‡					
Men	4.82	3.91	4.45	5.30	4.03
Women	3.50	4.44	5.24	4.12	2.67
General surgery§					
Men	51.16	49.17	48.81	43.62	39.09
Women	35.71	22.86	31.25	22.22	27.55
Total**					
Men	25.26	26.90	28.76	27.22	22.08
Women	6.87	9.62	15.09	13.02	12.22

* Within each graduation cohort, the proportion of those men and women in a year-one specialty area who were in a subspecialty of that area in the last year of their graduate medical education (1975 and 1976 cohorts excluded).

† Subspecialties of internal medicine include: dermatology, allergy, immunology, cardiology, gastroenterology, rheumatology, hematology, nephrology, oncology, endocrinology, and geriatrics. Neurology and psychiatry are excluded.

‡ Subspecialties of pediatrics include: adolescent medicine, neonatal-perinatal medicine, and pediatric allergy, cardiology, endocrinology, hematology, oncology, and nephrology.

§ Subspecialties of general surgery exclude obstetrics and gynecology.

** Proportion subspecializing among those who had year-one residencies in internal medicine, pediatrics, or general surgery.

TABLE 6

Years and Gaps in Graduate Medical Education, by Sex and Cohort*

Training Years and Gaps	1970 (36.20/ 29.93)†		1971 (32.51/ 25.35)†		1972 (20.68/ 22.42)†		1973 (14.91/ 16.26)†		1974 (9.40/ (10.09)†	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Total number of years in graduate medical education										
Men	3.87	1.48	3.76	1.39	3.62	1.41	3.43	1.28	3.03	1.06
Women	3.69	1.42	3.67	1.35	3.46	1.41	3.30	1.24	2.99	1.09
Total number of months in gaps										
Men	5.79	10.92	5.23	10.17	2.99	7.34	1.99	5.70	0.99	3.76
Women	5.61	12.01	4.50	10.12	3.30	7.87	2.30	6.20	1.04	3.76

* The 1975 and 1976 cohorts are excluded from this table since their graduate medical careers are not complete.

† Proportion of men/women with gaps in training.

Women spend slightly fewer months than men, on average, and the small sex difference is observed to be decreasing. Thus, the slightly greater tendency of women to switch specialties does not prolong their graduate careers, in the aggregate, beyond those of men.

The proportion of physicians experienc-

ing gaps in their residency training may be declining in general (from about 30 percent in the 1970 cohort to 10 percent in the 1974 cohort), but the smaller proportions for recent cohorts may reflect only the fact that they have been followed for fewer years. Nevertheless, male and female patterns are converging. Men formerly displayed a greater tendency than women to suspend training (probably due to military service). Beginning with the 1972 cohort, women displayed a slightly greater tendency than men to suspend training, although the apparent universal decline in the tendency to suspend training resulted in smaller sex differences over time.

The average length of gaps in graduate training is the third variable examined in Table 6. Here the magnitude of the sex difference is small, less than one month on average, although the amount of variance is high. Beginning with the 1972 cohort, women spent slightly more time in training gaps, with the average sex difference less than one month. Thus, convergence appears to have been nearly attained on this variable, as women and men are equally efficient in confining gaps in training to periods not exceeding a few months.

Discussion

This study shows that for graduates of U.S. medical schools during the period of 1970 to 1976, the career behavior of men and women tended to become more similar. As this was a period of marked increase in the proportion of women in entering and graduating medical school classes, the trends observed indicate that the recent influx of women has not substantially altered physician career patterns.

The specific behaviors on which sex differences were observed to diminish were specialty choice of the first and last graduate medical education years, frequency of specialty switching between the first and second years of GME (in psychiatry and pediatrics only), frequency of subspecialization in internal medicine, frequency of breaks in the GME process, length of these breaks, and total length of GME. These behaviors have important implications for planning: they reveal converging specialty distributions and suggest that future male and female career patterns will become more similar.

The inconsistent findings across specialty areas with regard to switching and subspecialization rates suggest that the specialty areas themselves become the salient social contexts in which graduate physicians make career decisions. The specialties range from those with a small minority of women (for example, surgery and its subspecialties) to those in which women are a sizable subgroup (for example, pediatrics and its subspecialties). Thus, sex differences within different specialties would be expected to vary, following Kanter's (11) argument.

If this were true, the rates of specialty migration among men and women should be converging in those source specialties in which women constitute a larger proportion of the residents. The apparent switching patterns in psychiatry and pediatrics support this contention, and the continued disparity between male and female switch rates in surgery is consistent with the argument. Whereas the social context within medical schools has changed sufficiently to encourage more women to enter surgical residencies (as suggested by the data in Table 2), the surgical area itself is still highly male and has not yet "tilted" sufficiently to support women's careers as often as men's.

In addition, the somewhat greater susceptibility of women to switching suggests either a different opportunity structure for women (for example, discriminatory practices in certain areas discouraging subspecialization) or a sex difference in coping with dissatisfaction or uncertainty in the

early graduate career. For example, the frequency with which women enter internal medicine in the first graduate year and switch from internal medicine in the second year suggests that women may be more likely than men to postpone the selection of a specialty area.

Two trends in the present data contradict the convergence hypothesis, however. The fluctuating rate at which women subspecialize within pediatrics is inconsistent with the slight trend toward greater subspecialization among women in general and with the relatively high proportional representation of women in pediatrics. Further, the emergence of obstetrics/gynecology as a specialty which women are more likely than men to enter suggests a reversal, rather than convergence, of the traditional pattern of sex differences.

Both of these findings appear to reflect recent attitudinal shifts among graduate women physicians toward providing primary care services to women and children. Gough (12) found that women were significantly more likely than men to prefer obstetrics/gynecology in 1971, although the present data demonstrate that women began entering obstetrics/gynecology in greater proportion than men in 1975. Data from a study (13) of specialty preferences among the 1976 graduates of U.S. medical schools show that among the potential primary care areas (that is, family practice, general internal medicine, pediatrics, and obstetrics/gynecology), men were more likely to prefer family practice and internal medicine, whereas women were more likely to prefer pediatrics and obstetrics/gynecology. The evolving interest in primary care among women may in part reflect more liberal patient attitudes toward female physicians.

The predominant pattern observed in this analysis is one of convergence of male and female behavior patterns rather than continued divergence or dramatically different patterns for the profession as a whole. Two implications for the roles of women and for the development of professions are apparent. First, increasing the proportionate representation of women in the profession through preferential recruitment or affirmative action would appear to expose women to similar opportunity structures as men and to result in their behavior becoming more similar to that of men. Second, since behavior of men and women tends to converge under these conditions, new directions for the profession are not to be expected as a consequence of altering the sex composition of the profession. Rather, the proportional shift in sex composition portends career patterns less divergent than those which formerly characterized male and female physicians.

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Work Patterns, Practice Characteristics, And Incomes of Male and Female Physicians

Joel D. Bobula

Abstract—The purpose of this study was to examine differences in work patterns and practice characteristics of male and female physicians using data from the American Medical Association's Twelfth Periodic Survey of Physicians conducted in 1978. Following are some of the major findings: Male physicians were more likely than female physicians to work either in the traditional solo, fee-for-service practice or in a group-practice setting. Female physicians were more likely to be found in some other setting such as a clinic, student health center, local government agency, or corporation and were more frequently reimbursed on a salary basis. Male physicians worked more hours per week (50.9 versus 43.7) and more weeks per year (47.1 versus 45.9) and were reimbursed at a higher annual level ($62,700 versus $43,700) than their female counterparts. Even if women worked the same number of hours per week and weeks per year as men, the mean income from medical practice for females would be 83 percent of the mean income for males. The differential, however, diminished over the five-year period between 1972 and 1977.

The number of women in the field of medicine has increased dramatically in recent years, from 21,404 in 1967 to 41,459 in 1977 (1). Growth in the number of female applicants to medical school has been even more impressive. The percentage of women entering the first year of medical school rose from 9.2 percent in academic year 1969–70 to 25.7 percent in 1977–78 (2).

Given the recent and projected expansion of the supply of female physicians, it is important to examine whether the changing sex composition of physicians will have any effect on the practice characteristics and work patterns of the physician labor force. Previous investigators (3, 4) have found that women physicians tend to practice shorter hours and earn less income than male physicians. In this paper the author examines data from a recent survey of a sample of nonfederal, office-based physicians to determine whether any systematic differences exist between the sexes in each of the following areas: type of practice, reimbursement system, number of hours worked per week and weeks worked per year, patient characteristics, and average income for selected specialty categories.

The first section of this paper describes the data source employed in the study. The second section presents the survey findings as well as a comparison of the results with previously published findings to determine whether any changes in work patterns and

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practice characteristics have occurred over time. The final section contains a discussion of the potential effect the increase in female physicians may have on the manner in which physicians organize their practice, systems of reimbursement, and supply of services.

Data

Data for the analysis is from the American Medical Association's Twelfth Periodic Survey of Physicians conducted in 1978. (The author reported on the survey methodology in 1979 [5].) Two samples were drawn from the AMA's Physician Masterfile, which contains current and historical information on every known physician in the United States. The first was a random sample of approximately 5 percent of all nonfederal, office-based physicians in the United States. The second was a sample of an additional 2,099 female physicians. This sample was required because of the small number of female physicians in the original 5 percent sample. The additional physicians were necessary to ensure sufficient representation in selected demographic and specialty categories for statistical purposes.

The Physician Masterfile has some limitations. A number of investigators have attempted to measure the reliability of AMA physician data. Results of these validation studies (a summary of the studies is contained in an article by Goodman and Eisenberg [6]) indicate that physician location data contained in the masterfile are 93.4 to 97.9 percent accurate. Specialty designations could not be validated for 8.6 to 11.9 percent of the specialties listed on the masterfile. The data item with the largest variance was professional activity (for example, office based or hospital based). The studies indicated that 9.7 to 17.6 percent of the physicians' records with respect to professional activity could not be validated. As a result, a number of ineligible physicians were inadvertently included in the samples whose responses were subsequently disregarded.

Self-administered questionnaires were mailed to each of the samples in the spring of 1978. Follow-up attempts continued through the summer. By September 1978, 4,465 usable questionnaires had been returned from the main sample, and 972 usable responses had been obtained from the female oversample.

Female physicians in the sample (as in the population of office-based physicians) were underrepresented in the surgical specialties and overrepresented in the specialties of pediatrics and psychiatry. Female respondents also tended to be younger and tended to locate in large metropolitan areas of the United States, reflecting the fact that women have only recently gained entry to medical school in significant numbers and the general trend among younger physicians to practice in major urban areas.

Results

Survey findings are presented for each of the following categories: practice characteristics, work patterns and income from medical practice, and patient characteristics. This is followed by a comparison of the survey results with previously published findings.

PRACTICE CHARACTERISTICS

Male physicians were more likely than female physicians to work in the traditional solo or group-practice setting (Table 1). Women were more often found in some other setting, such as a clinic, student health center, local government agency, or corporation.

Physicians were asked to indicate the percentage of their 1977 net income from medical practice that was derived from each of the following sources: revenue from own patients in a solo or "expense

sharing only" practice arrangement, salary, share of practice income, and other. The source from which the physician indicated the majority of his or her income was derived was used to classify each physician by method of reimbursement. Men were more likely to be reimbursed on a fee-for-service basis or to share the income of a group practice on some predetermined basis (Table 1). This finding is expected since men were also more likely to work in a solo or group practice setting wherein fee-for-service and income-sharing arrangements are the most common methods of reimbursement. Women, on the other hand, were more likely to be reimbursed on a salary basis.

WORK PATTERNS AND INCOME

Male physicians worked more hours per week and more weeks per year on average than female physicians (Table 2). This finding is consistent across specialties, and the difference is statistically significant for almost every specialty. (For hours of work only the difference between male and female anesthesiologists was not statistically significant. For weeks practiced, only the differences for surgeons and radiologists were not statistically significant. For income from medical practice, only the differences for surgeons and anesthesiologists were not significant.) If male and female physicians had been equally represented in the nine specialty categories depicted in Table 2, males would have worked an average of 50.9 hours in their most recent complete week compared with 43.7 hours for female physicians. Similarly, males would have worked an average of 47.1 weeks in 1977 compared with 45.9 weeks for females.

Mean net income from medical practice shows a similar pattern. If the distribution of male and female physicians across specialty categories had been identical, males would have earned an average of $62,700 in 1977. Female physicians would have earned an average of $43,700 or roughly 70 percent of the mean income from medical practice for males. The actual difference between male and female physicians is slightly larger than is reported. This is due to the fact that women are overrepresented in those specialties with lower mean incomes such as pediatrics and psychiatry. If females worked the same number of hours per week and weeks per year as

TABLE 1

Distribution of a Sample of Office-Based Patient-Care Physicians by Type of Practice, Method of Reimbursement, and Sex, 1978

Item	Male		Female	
	No.	Percent	No.	Percent
Type of practice				
Solo	2,043	49.5	413	43.3
Partnership or group	1,755	42.5	291	30.5
Other	322	8.0	249	26.1
Total	4,130	100.0	953	100.0
Method of reimbursement				
Fee-for-service	2,285	59.3	434	49.7
Salary	957	24.8	342	39.2
Share of practice income	511	13.2	63	7.2
Other	103	2.7	34	3.9
Total	3,856	100.0	873	100.0

SOURCE: Twelfth Periodic Survey of Physicians, 1978, American Medical Association Center for Health Services Research and Development.

males, the ratio of female physician income to male physician income would have increased from 70 percent to 83 percent. Why such a differential continues to exist is unclear. One could argue that the differential reflects discrimination against female physicians. However, the differential may also be due to the absence of a number of control variables such as differing levels of work experience or differences in the quality and/or extent of undergraduate and graduate medical education.

PATIENT CHARACTERISTICS

On the average, the patients of female physicians were found more often to be female, nonwhite, and younger than the patients of male physicians (Table 3). Although the differences are not large, the findings are fairly consistent across specialties, and the differences are often statistically significant. (For certain specialties, such as general/family practice and internal medicine, the differences are statistically significant for all three categories. For radiologists the differences are not statistically significant, in part due to the small number of female radiologists in the sample.) As would be expected, this pattern is more pronounced for primary care physicians, who have more patient contact, than for physicians in secondary and tertiary care specialties such as radiology, anesthesiology, and surgery.

For all specialties the mean percentage of female patients was 62.4 percent for women physicians compared with a mean of 59.5 percent for men. The percent of patients who were white was 83.1 percent for male physicians and 77.5 percent for women. The percent of patients over the age of 65 was 30.5 and 25.0 percent for men and women physicians, respectively.

TRENDS OVER TIME

Previous studies have been conducted to examine a subset of the variables under investigation in this study. Data on male and female work patterns and income from medical practice were collected by the American Medical Association's Center for Health Services Research and Development in 1973. Information on the number of hours practiced in the most recent complete week, number of weeks worked in 1972, and the mean net income from medical practice in 1972 for male and female physicians have been reported by Kehrer (3). In general, the differences in income, hours of work, and weeks practiced between male and female physicians have decreased from 1972 to 1977 for these variables.

The difference in the number of hours worked per week was 9.6 hours in 1973. The findings of this study indicate that the difference had decreased to 7.2 hours. The decrease was due almost entirely to an increase in the number of hours worked by female physicians—from 41.8 hours per week in 1973 to 43.7 hours in 1978. The difference in weeks worked declined slightly over the five-year time period, from 1.3 weeks to 1.2 weeks.

The income differential between males and females also declined during this period. Table 4 contains information on the mean net income per hour from medical practice for male and female physicians in nine specialty categories over the 1972 to 1977 time period. The ratio of female to male hourly income increased from 75.5 percent in 1972 to 83.2 percent in 1977.

Conclusions

This study examined differences in work patterns and practice characteristics of male and female physicians. It was found that female physicians were less likely to work in traditional practice settings, worked fewer hours per week, were reimbursed at a lower annual level, and had a

TABLE 2

Mean Number of Hours Worked Per Week and Weeks Worked Per Year and Net Income from Medical Practice, by Specialty and Sex

Specialty*	Total No. of Hours Practiced in Most Recent Complete Week				Mean No. of Weeks Practiced in 1977				Mean Net Income from Medical Practice in 1977			
	Male		Female		Male		Female		Male		Female	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
General/family practice	49.9	0.5	41.6	1.3	47.3	0.2	45.2	0.7	51,400	1,100	32.900	2,100
Internal medicine	53.2	0.5	46.0	1.6	47.2	0.2	46.7	0.8	62,300	1,300	37.200	3,100
Surgery	53.3	0.5	47.7	2.8	47.0	0.2	46.4	1.0	74,200	1,400	60,600†	7,800
Pediatrics	49.9	0.8	39.1	1.1	47.2	0.4	45.7	0.5	50,600	1,600	31,000	1,500
Obstetrics-gynecology	51.7	0.9	42.0	1.7	47.7	0.3	45.5	0.9	71,500	2,200	41.900	3,100
Radiology	48.0	0.6	41.2	2.7	47.1	0.3	47.7	1.1	78,000	2,900	56,200†	6,700
Psychiatry	46.5	0.8	37.4	1.0	47.2	0.3	46.2	0.5	50,500	1,400	32,600	1,900
Anesthesiology	50.8	1.0	47.6	1.7	46.1	0.5	43.6	1.2	67,500	2,900	59,600	5,000
Other	46.6	0.7	41.9	1.4	46.7	0.3	44.5	0.8	57,100	1,700	38,400	2,300
All specialties	50.9		43.7		47.1		45.9		62,700		43,700	

* The mean for all specialties is a weighted mean. The mean for each specialty was weighted by the proportion of physicians in the population of office-based physicians in that specialty.

† Fewer than 30 observations.

SOURCE: Twelfth Periodic Survey of Physicians, 1978, American Medical Association, Center for Health Services Research and Development.

TABLE 4

Mean Net Income per Hour from Medical Practice by Specialty and Sex, 1972 and 1977

Specialty*	Mean Net Income per Hour (In dollars)				Ratio of Female to Male Hourly Income	
	1977		1972		1977	1972
	Male	Female	Male	Female		
General/family practice	21.80	17.50	17.60	11.20	80.3	63.6
Internal medicine	24.80	17.30	18.90	12.10	69.8	64.0
Surgery	29.60	27.40†	24.00	21.50†	92.6†	89.6†
Pediatrics	21.50	17.30	18.30	12.00	80.5	65.6
Obstetrics-gynecology	29.00	21.90	22.70	17.30	75.5	76.2
Radiology	34.50	28.60†	28.70	21.70†	82.9†	75.6†
Psychiatry	23.00	18.90	18.50	15.30	82.2	82.7
Anesthesiology	28.80	28.70	21.60	16.30	99.7	75.5
Other	26.20	20.60	22.60	16.80	78.6	74.3
All Specialties	26.20	21.80	20.80	15.70	83.2	75.5

* The mean for all specialties is a weighted mean. The mean for each specialty was weighted by the proportion of physicians in the population of office-based physicians in that specialty.

† Fewer than 30 observations.

SOURCES: Twelfth Periodic Survey of Physicians, 1978, American Medical Association Center for Health Services Research and Development. Also, Kehrer (3).

slightly different composition of patients than male physicians.

The rapid increases in the number of female medical school enrollees and the subsequent increase in the number of practicing female physicians could be expected to have an effect on the manner in which physicians organize their practices in the future and also on the future supply of physicians' services. For example, physicians in the future may be willing to practice in less traditional organizational settings and to be reimbursed in a different manner than the traditional solo, fee-for-service system. Also physician workweeks could be shorter, with the result that there would be fewer physician services and increased demand for more physicians.

Such an interpretation, however, rests on the assumption that future career choices of female physicians will be similar to the career choices of female physicians in the past. A plausible explanation (although not the only one) for the finding that women have more often chosen salaried employment in less traditional organizational settings and have worked fewer hours is that historically women have assumed a disproportionate share of family and household responsibilities. Even if this explanation is correct, it is not clear that women who graduate from medical school in the future will necessarily balance career and family responsibilities in the same manner as their predecessors. A comparison of the findings of this study with previously published results indicate that differences in work patterns and income are diminishing over time.

Thus, it would appear to be inappropriate at this time to infer that the rapid increases in the supply of female physicians will have a significant impact on either the organization of physicians' practices or the supply of physicians' services. Future research should be directed at monitoring the findings and trends outlined in this study as more women enter the physician labor force. Similarly, more attention must be devoted to gaining a better understanding of the cause or causes of the male-female income differential and the factors that have caused the differential to diminish over time.

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DATAGRAM

State Funds in Support of Public and Private Medical Schools, 1979

For the 1978–79 school year, 43 states and Puerto Rico made available $1,080,000,000 to the medical schools located in the state or jurisdiction providing the funds (Table 1). Seventy-three of the 75 public medical schools received $1,001,000,000 from 40 states and Puerto Rico. Information was not available on the funds provided by the state of Washington to the University of Washington School of Medicine; and the Uniformed Services University of the Health Sciences is supported by the federal government. Of the 51 private medical schools in existence in 1979, 35 received $79 million from 16 states where the schools are located; 16 private medical schools located in seven states, Puerto Rico, and the District of Columbia did not receive funds from the governments in those jurisdictions (Howard University College of Medicine in the District of Columbia is funded by the federal government).

In addition to the $1,080,000,000 provided by governments to the medical schools located in their jurisdictions, $2.4 million was paid to seven public medical schools (not including the University of Washington) and $2.2 million to four private medical schools through regional education boards and bilateral contract agreements. Those state funds were paid to schools located outside the state providing the funds for the enrollment of the state's residents.

Information on state support of medical schools was reported in the Liaison Committee on Medical Education (LCME) Annual Medical School Questionnaire Part I-A—Medical School Financing. The data in Table I do not include state government grants and contracts and, where accounting procedures permit, exclude state funds for the support of teaching hospitals and clinics. The coverage of state funds to public medical schools includes, however, the support of medical school programs provided by the parent university but paid for out of appropriations from the state to the parent university.

In the 1976 and 1977 reviews of state support to medical schools (March 1976 and July 1977 issues of this journal), a state-by-state compilation was shown of the state funds to public medical schools per full-time equivalent student enrolled. This ratio is no longer included, because it is no longer believed to provide a useful index. The schools vary greatly in the degree to which they have access to other sources of income to support their operations, and the scope of state-supported activities differs widely among the schools, often including medical and health programs as well as educational programs. It should also be noted that state funds to developing schools are included for North Carolina, South Carolina, Tennessee, and West Virginia. However, as the full complement of students has not yet been enrolled, the ratio of funds per student is abnormally high.

The sources for the comparison measures shown in Table 1 are: state residents--Bureau of the Census, Current Population Reports, *Population Estimates and Projections*, Series P-25, No. 876; personal income by state—U.S. Department of Commerce, *Survey of Current Business*, April 1980.

Generally, state funds to private medical schools have been provided to encourage the private medical schools to enroll residents of their state, with the amount of the support being based on the number of residents enrolled. The following is a summary of the 1979 programs for the support of private medical schools located in the state providing the funds.

Florida—Capitation allowance of $10,000 for each Florida resident enrolled in the M.D. program and $12,000 for each Florida resident enrolled in the Ph.D. to M.D. degree program.

Georgia—Through the Southern Regional Education Board, capitation allowance of $7,500 for each Georgia resident enrolled over a base period number; in addition, a special appropriation to the developing private school.

Illinois—Through the Illinois Board of Higher Education, capitation allowance, up to a ceiling amount, of $4,200 per year for Illinois residents enrolled in a four-year program and $5,600 a year for

TABLE 1

State Funds in Support of Public and Private Medical Schools Located in the State, 1979

State and Other Area	Public Medical Schools			Private Medical Schools	Amount of State Funds to Public and Private Medical Schools	
	Total	Funds Provided Directly to Medical School	Funds Provided Through Parent University		Per State Resident	Per $10,000 Personal Income
	(In thousands of dollars)					
Total	$1,000,613	$883,779	$116,834	$79,446	$ 5.07	$ 5.85
Alabama	42,913	41,832	1,081		11.51	16.32
Arizona	14,339	14,339			6.04	7.05
Arkansas	8,507	8,507			3.93	5.75
California	102,704	80,893	21,811		4.60	4.56
Colorado	8,205	8,205			3.03	3.30
Connecticut	11,613	11,613			3.72	3.74
Florida	26,047	26,047		5,825	3.68	4.21
Georgia	17,426	12,239	5,187	1,837	3.80	5.00
Hawaii	7,087	6,256	831		7.86	8.11
Illinois	48,406	32,951	15,455	6,742	4.91	5.00
Indiana	21,872	21,872			4.06	4.66
Iowa	12,919	12,919			4.45	5.18
Kansas	29,183	29,183			12.43	13.60
Kentucky	16,918	16,918			4.85	6.53
Louisiana	24,682	24,682		619	6.36	8.42
Maryland	14,518	7,862	6,656	356	3.59	3.92
Massachusetts	12,242	12,242		286	2.17	2.46
Michigan	48,490	41,179	7,311		5.28	5.68
Minnesota	19,899	18,830	1,069	1,160	5.23	5.92
Mississippi	13,339	13,339			5.53	8.91
Missouri	13,919	11,711	2,208		2.87	3.52
Nebraska	14,008	12,599	1,409		8.93	10.67
Nevada	1,474	1,474			2.21	2.06
New Hampshire				90	.10	.12
New Jersey	32,056	25,885	6,171		4.38	4.51
New Mexico	8,570	8,570			7.05	9.47
New York	64,411	58,475	5,936	13,794	4.41	4.87
North Carolina	30,132*	30,132		2,274	5.82	7.85
North Dakota	6,071	6,071			9.30	11.89
Ohio	43,994	42,216	1,778	4,841	4.55	5.19
Oklahoma	13,000	13,000			4.57	5.46
Oregon	10,039	6,628	3,411		4.09	4.49
Pennsylvania	3,389	3,389		23,012	2.24	2.63
Puerto Rico	8,817	3,315	5,502		2.67	9.11
Rhode Island				1,000	1.07	1.30
South Carolina	25,200*	22,534	2,666		8.68	12.23
South Dakota	2,879	2,879			4.17	5.70
Tennessee	23,265*	12,625	10,640		5.37	7.28
Texas	128,290	119,928	8,362	12,693	10.81	12.18
Utah	5,496	5,496			4.17	5.60
Vermont	3,910	2,297	1,613		8.03	10.89
Virginia	31,407	27,250	4,157	1,208	6.30	7.29
Washington†						
West Virginia	11,684*	14,104	3,580		9.50	12.60
Wisconsin	11,293	11,293		3,709	3.20	3.78

* Includes state appropriations to the developing public medical schools in the state; these schools have not yet reached their planned full medical and other student enrollment.

† Data not available.

Note: State funds to public medical schools have been reduced in those instances where tuition and other medical school income have reverted to the state government treasury. See text for sources of data underlying the state funds per resident and per personal income.

Illinois residents enrolled in a three-year M.D. degree program.

Louisiana—Capitation allowance of $5,000 for each Louisiana resident enrolled in the M.D. degree program, for up to 50 residents per class. Due to budgetary consideration, the actual allowance has been less than $5,000 per resident.

Maryland—Capitation allowance per full-time equivalent student equal to 17.5 percent of the state appropriation to the public four-year colleges per full-time equivalent student.

Massachusetts—Through the New England Board of Higher Education, capitation allowances to two private medical schools of $9,300 for the enrollment of up to 21 Massachusetts residents.

Minnesota—Capitation allowance of $8,000 for each Minnesota resident up to a ceiling of 40 students per class.

New Hampshire—Capitation allowance of $7,500 for each New Hampshire resident.

New York—Funds to private medical schools through three types of contractual arrangements: (*a*) enrollment expansion aid—$3,500 per year for New York state residents admitted from foreign medical schools under the "Fifth Pathway" program or through the Coordinated Transfer Application System; (*b*) capitation allowance—$2,000 per full-time student; 70 percent of school's entering class must be New York state residents for the school to receive all of the capitation allowance, and the capitation award decreases proportionately for a less than 70 percent resident student enrollment; (*c*) Bundy plan—$3,100 for each M.D. and Ph.D. graduate and $650 for each master's degree graduate, except for students counted under (*a*).

North Carolina—Capitation allowances to the two private medical schools for each North Carolina resident enrolled. One school receives $4,500 plus $500 for a special scholarship fund for North Carolina residents; the other school receives $7,000 plus $1,000 for the scholarship fund.

Ohio—State level of support per medical student equal to the state appropriation per medical student to the public medical schools in the state.

Pennsylvania—Capitation allowances of $4,000 to each of the four private schools and varying levels of support provided to the two state-related schools.

Rhode Island—State level of support is not conditioned upon student residence in the state, but one-fourth of the students are state residents.

Texas—State level of support based upon the state appropriations, per medical student, to the public medical schools in the state. An informal agreement provides that 70 percent of each entering class be state residents.

Virginia—Capitation allowance of $5,333 per student.

Wisconsin—Capitation allowance of $8,327 for each Wisconsin resident.

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NOTE

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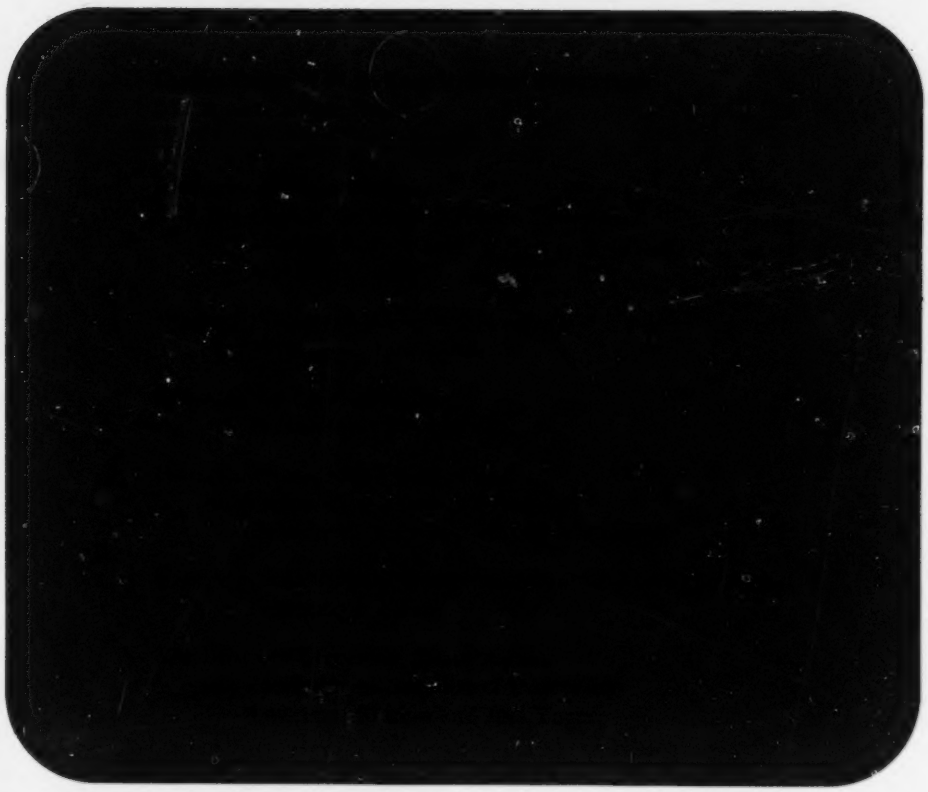

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TABLE 3

Patient Characteristics by Specialty and Sex of Physicians, 1978

Specialty*	Mean Percentage of Patients											
	Female				White				Over 65			
	Male Physicians		Female Physicians		Male Physicians		Female Physicians		Male Physicians		Female Physicians	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
General/family practice	61.4	0.4	69.7	1.5	84.7	0.7	78.6	2.0	34.3	0.7	26.1	1.7
Internal medicine	57.4	0.4	62.1	1.9	85.1	0.7	76.2	2.6	43.6	0.9	37.1	2.5
Surgery	54.0	0.4	52.0	1.7	83.9	0.5	82.6	2.3	36.0	0.6	29.1	2.7
Pediatrics	50.4	0.3	52.1	0.6	78.0	1.6	68.2	2.1	2.2	1.0	0.7	0.5
Obstetrics-gynecology	99.8	0.1	99.2	0.4	81.7	1.1	79.1	2.1	11.5	0.8	10.7	1.2
Radiology	53.8	0.6	52.0†	2.0	79.1	1.7	72.3†	4.8	38.8	1.4	33.9†	4.3
Psychiatry	56.8	0.8	64.3	1.4	88.0	1.0	83.1	1.7	9.1	0.7	7.5	1.2
Anesthesiology	55.8	1.1	54.9	2.1	80.6	1.6	67.8	3.4	30.6	1.6	30.3	2.5
Other	53.8	0.9	58.6	1.8	76.6	1.3	70.7	2.8	27.4	1.2	21.5	2.3
All specialties	59.5		62.4		83.1		77.5		30.5		25.0	

* The mean for all specialties is a weighted mean. The mean for each specialty was weighted by the proportion of physicians in the population of office-based physicians in that specialty.

† Fewer than 30 observations.

SOURCE: Twelfth Periodic Survey of Physicians, 1978, American Medical Association Center for Health Services Research and Development.

Career Paths of First-Year Resident Physicians: A Seven-Year Study

Kathryn M. Langwell

Abstract—Much policy formulation and research on physician manpower supply and demand are based upon historical data on physicians or on medical students' attitudes toward career choices and expectations about future career plans. Neither of these sources provides the kind of information about specialty and location choices of recent graduates that planners require to design and evaluate effective policy. In order to obtain information on career decisions of young physicians, all 1968 first-year resident physicians were identified and their careers were followed through the seven-year period from 1968 through 1975. The career decisions of this cohort were compared with the activity, specialty, and geographic distribution of all physicians in 1975 in an attempt to discern changes, or trends, in these decisions. Results of this evaluation indicate that young physicians are attracted to nonprimary-care specialties in greater numbers than were physicians in the past and are continuing the trend away from rural practice locations. Increasing numbers of women physicians are affecting these trends, and changes in the sex-composition of the physician stock must be taken into account in future forecasting efforts and in policy formulation activity.

Concern about the availability of, and access to, medical care in the United States has been a cause of numerous policy actions designed to influence the career decisions of young physicians. Loan forgiveness programs, establishment of the National Health Service Corps scholarship programs, and preferential medical school admissions programs were developed to address the issue of geographic maldistribution of physician manpower. Interest in affecting the specialty choices of young physicians also is apparent in the provisions of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484), which tie capitation grants to medical schools to a requirement that at least 50 percent of affiliated residency programs be in primary care specialties (family practice, internal medicine, pediatrics, and obstetrics-gynecology).

Forecasts of future supply of physicians' services by specialty and geographic location may be developed on the basis of trends which are apparent from examination of changes in the total number of physicians. Alternatively, surveys of medical students or young physicians may be conducted to determine projected career plans of a specific group (1, 2). The infor-

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mation obtained from analyses based either on historical data or on prospective plans of individuals may be inadequate for purposes of policymakers, however. Historical data do not provide indications of changes in recent medical school graduates' perceptions and preferences. This is a critical issue, currently, as the sex- and racial-composition of U.S. medical students has changed substantially during recent years. In addition, fluctuations in the numbers and countries of origin of foreign medical graduates have been frequent and dramatic over the past decade. Although surveys of student attitudes and career plans might appear to resolve at least the first problem raised, information obtained in these surveys may be even more unreliable than are historical data, since medical students' career plans may change as they progress through the medical education system. Longitudinal studies of young physicians' careers provide the most reliable data on career preferences of physicians. In the past, data limitations, that is, small or nonrepresentative samples, have made this type of study difficult or have restricted the applicability of findings to policymaking efforts.

The purpose of this paper is to present information on career paths of all young physicians who began an initial U.S. residency in 1968. These young physicians' careers are followed through 1975; and data are presented on the following issues of interest to medical educators and to policymakers: licensure and certification, major professional activities, specialty choices, and location decisions. The information available is presented separately for men and women residents.

In addition to summary data on young physicians' career decisions, comparative data for all U.S. physicians are presented for major professional activity, specialty, and geographic distribution. These comparisons are shown in order to reveal changes in these factors which may represent trends that should be considered in both policy-formulation and forecasting efforts. It should be recognized that this group of physicians completed undergraduate medical education 12 years ago, and there have been substantial changes in health professional education in the past decade (for example, the expansion of family practice residency programs, and continuing increases in the number of women medical students). Data on a more recently graduated cohort of physicians are not available for analysis due to the time lag between graduation and establishment of medical practice and the months required for data collection and processing considerations. Thus, the summary information on career decisions of young physicians presented in this paper are based on the most recent national physician cohort data available, and it adds useful information to the existing literature on physicians' career decisions.

Data

Data for this study are from the American Medical Association's Physician Masterfile. The Physician Masterfile contains information on every physician in the United States and on those graduates of U.S. medical schools who are temporarily practicing overseas. The file also includes graduates of foreign medical schools who are in the United States and meet U.S. educational standards for recognition as physicians.

A record is started for each physician upon his entry into medical school or, in the case of foreign and Canadian graduates, upon entry into the United States. As the physician's training and career develops, additional information is added to the file (for example, indication of internship and residency training, licensure, and board certification). In addition to these historical data, current information such

as address, professional activity, and employment status is continually updated (3).

The research file used for this study was constructed by identifying all individuals in residency programs in 1968 who were not in practice or in a residency program in 1967. These records of 1968 first-year residents were then selected for follow-up. Information on subsequent residency programs, licensure, certification, and other professional data were obtained from the AMA Physician Masterfile for each year from 1969 through 1975 for each resident. Thus, a seven-year record of career decisions of these young physicians was constructed.

Characteristics

Examination of this population of physicians reveals that 1968 first-year residents exhibited the following characteristics:

1. Men physicians were the preponderant majority, making up 88.3 percent of the group. Only 11.7 percent (1,456 persons) were women physicians.

2. Foreign medical graduates (FMGs) represented 34.1 percent of all 1968 first-year residents. Only 31.4 percent of men were FMGs, however, compared with 54.9 percent of women physicians.

3. The age of first-year residents ranged from 21 years to 62 years. However, 70.5 percent were 25–28 years old in 1968 (Table 1).

4. Almost 15 percent of first-year residents completed one continuous residency program only and then went directly to medical practice or engaged in other nonpatient care activity (Table 2).

5. Eighty-five percent of residents had two or more residencies involving a change in specialty area or emphasis or a move to a different hospital for training in the same specialty; 40.8 percent participated in a third residency program; and 10.7 percent reported four to six residency programs between 1968 and 1975 (Table 2).

6. In 1975 there were 1,091 physicians who remained in residency programs. This represented 8.7 percent of the initial pop-

TABLE 1

Age Distribution of 1968 First-Year Resident Physicians in U.S. Programs, by Sex

Age	1968 First-Year Resident Physicians					
	All		Men		Women	
	No.	Percent	No.	Percent	No.	Percent
Under 25	706	5.6	558	5.0	148	10.2
25	2,380	19.1	2,093	19.0	287	19.7
26	4,047	32.4	3,696	33.5	351	24.1
27	1,463	11.7	1,313	11.9	150	10.3
28	911	7.3	785	7.1	126	8.7
29	629	5.0	546	5.0	83	5.7
30	479	3.8	418	3.8	61	4.2
31	397	3.2	350	3.2	47	3.2
32	310	2.5	288	2.6	22	1.5
33	203	1.6	179	1.6	24	1.6
34	169	1.4	142	1.3	26	1.8
35	143	1.1	121	1.1	22	1.5
36	118	0.9	100	0.9	18	1.2
37	75	0.6	68	0.6	7	0.5
38	79	0.6	65	0.6	14	1.0
39	58	0.5	49	0.4	9	0.6
Over 39	308	2.5	247	2.2	61	4.2
Total	12,475	100.0	11,019	100.0	1,456	100.0

ulation. No information was available on whether these 1,091 physicians had been continuously in residency training programs during the seven-year period. It is possible that they had completed a residency program, established a medical practice or accepted a salaried position, and then decided to seek additional training after practicing for some period. During the time period of this study, men physicians were required to serve in the military. Some physicians may have completed one or more years of residency training, joined the military forces, and then reentered residency training after completion of their military obligation. Unfortunately, due to data limitations, it was not possible to examine these possibilities. Women were less likely to be in residency programs seven years after the initial residency; only 4.6 percent of women were reported in training in 1975. Foreign medical graduates were even less likely than women physicians to be in residency programs in 1975, with only 3.4 percent of FMGs remaining in graduate medical training for seven years.

Licensure and Certification

The vast majority of resident physicians were licensed to practice medicine in 1975 (Table 3). Full licensure in at least one state was reported for 90.2 percent of the group, and 98.5 percent of the total group were licensed, fully or temporarily, in the state in which they were practicing. Women were less likely to be fully licensed than were men, with only 84.0 percent reporting full licensure in any state; however, 97.7 percent of all women were licensed in the state in which they were practicing. This finding is apparently a result of the large proportion of women physicians who were FMGs.

TABLE 2

Distribution of 1968 First-Year Residents in U.S. Programs, by Number of Residency Training Programs Entered During 1968–1975 and by Sex

No. of Residency Programs	1968 First-Year Resident Physicians					
	All		Men		Women	
	No.	Percent	No.	Percent	No.	Percent
1	1,824	14.6	1,576	14.3	248	17.0
2	5,561	44.6	5,001	45.4	560	38.5
3	3,755	30.1	3,298	29.9	457	31.4
4	1,124	9.0	968	9.3	156	10.7
5	181	1.5	146	0.8	35	2.4
6	30	0.2	30	0.3	0	0.0
Total	12,475	100.0	11,019	100.0	1,456	100.0

TABLE 3

1975 Licensure Status of 1968 First-Year Resident Physicians in U.S. Programs, by Sex

Licensure Status	1968 First-Year Resident Physicians					
	All		Men		Women	
	No.	Percent	No.	Percent	No.	Percent
Full licensure	11,247	90.2	10,024	91.0	1,223	84.0
Temporary licensure	1,030	8.3	830	7.5	200	13.7
Not licensed	198	1.5	165	1.5	33	2.3
Total	12,475	100.0	11,019	100.0	1,456	100.0

The trend toward board-certification noted in other studies (4) is also evidenced by these young physicians (Table 4). Of the entire group, 46.1 percent (5,760 physicians) held one specialty board certification in 1975. A second board certification was already obtained by 120 physicians by that year. Women physicians were less likely to be board-certified than men (39.6 percent versus 48.1 percent). A majority of U.S. medical graduates were certified (54.2 percent) in 1975. However, only 34.4 percent of foreign medical graduates has sought or achieved board-certification by that time. These findings are consistent with results of other studies of FMGs and may possibly be explained by the fact that FMGs in many cases are already trained as specialists prior to coming to the United States. Consequently, they may be unwilling to spend the number of years in training which are requisite for board-eligibility.

Major Professional Activity

It was assumed, when this study was initiated, that seven years after residency training was initiated, the overwhelming majority of physicians would have completed training and established a practice. Examination of the major professional activity of these physicians in 1975 (Table 5) suggests that while most appear to have settled into their careers, a substantial minority remain in non-patient-care or in training positions.

The 57.5 percent of all first-year resident physicians who were either in office-based practice or on hospital staffs represents a smaller proportion of the total group than is found when these categories are combined for all U.S. physicians. In particular, 1968 first-year residents were considerably less likely to be in office-based practice by 1975 than are older physicians. However, it is possible that a substantial number of those on hospital staffs who currently are in residencies or are nonclassified may enter office-based practice as their careers progress.

Residents in 1968 appear to be slightly more likely than all U.S. physicians to be teaching or in research but are less likely to have entered administrative positions by 1975. Women physicians, however, were more likely than men to be in administrative or teaching positions but were slightly less likely to be engaged in research in 1975. Women physicians, in general, were considerably less likely than men to be in office-based practice seven years after their initial residency. They were also less frequently in hospitals, either as staff members or as continuing residents. Over four percent (62) of the women subjects reported their status as "inactive" in 1975. No information was available on the reasons for the "inactivity" of these women physicians and on whether their current status was viewed as permanent withdrawal from their career or was a temporary response to family (for

TABLE 4

Board Certification Status of 1968 First-Year Resident Physicians in U.S. Programs in 1975, by Sex

Board Certification Status	1968 First-Year Resident Physicians					
	All		Men		Women	
	No.	Percent	No.	Percent	No.	Percent
Not board certified	6,595	52.9	5,716	51.9	879	60.4
Board certified						
One specialty	5,760	46.1	5,193	47.1	567	38.9
Two specialties	120	1.0	110	1.0	10	0.7
Total	12,475	100.0	11,019	100.0	1,456	100.0

TABLE 5

Major Professional Activity of All U.S. Physicians and of 1968 First-Year Resident Physicians in U.S. Programs, by Sex, as of December 31, 1975

Major Professional Activity	1968 First-Year Resident Physicians						All U.S. Physicians*	
	All		Men		Women			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Office-based practice	4,772	38.3	4,313	39.1	459	31.5	216,533	52.9
Hospital staff	2,389	19.2	2,137	19.4	252	17.3	38,833	9.5
Resident physician	907	7.3	854	7.8	53	3.6	63,046	15.4
Administration	117	0.9	101	0.9	16	1.1	11,689	2.9
Research	291	2.3	261	2.4	30	2.1	8,514	2.1
Teaching	257	2.1	218	2.0	39	2.7	6,935	1.7
Other†	3,651	29.3	3,106	28.1	545	37.4	41,779	10.1
Inactive	91	0.7	29	0.3	62	4.3	22,117	5.4
Total	12,475	100.0	11,019	100.0	1,456	100.0	409,446	100.0

* Data in these columns are from *Profile of Medical Practice*, 1978 (5).

† Includes those whose major professional activity was unknown or was not classified as of the end of 1975.

example, pregnancy) or other considerations. In addition, a much larger proportion of women physicians (37.4 percent) were nonclassified by 1975 than was the case for men physicians.

Results of this examination of major professional activity of 1968 first-year resident physicians have implications both for future research activities and for policy formulation. These findings indicate that a majority of young physicians may not have chosen a definite practice mode or employment setting seven years after embarking on graduate medical training. Consequently, researchers may find it necessary to follow a given cohort of physicians for a longer period than this study encompassed in order to make definitive observations on current patterns in selection of professional activity mode.

Specialty Choices

The specialty mix of the physicians practicing in the United States has been a topic of increasing concern of policymakers in recent years. The decline in the proportions of young physicians choosing general or family practice and a less rapid, but persistent, decrease in primary care specialization raise questions with respect to access to primary care for future patient populations.

The 1975 specialty distribution of 1968 first-year resident physicians is shown in Table 6. Only 5.9 percent of men and 4.3 percent of women were reported being in general practice in 1975, compared with 15.9 percent of all U.S. physicians in that year. This dramatic difference in general practice choices suggests that few, if any, of these practitioners will be available in the future. In addition, data in Table 6 indicate that, overall, fewer young physicians are choosing primary care as a specialty area than has been the case in past years. Only 37.5 percent of young men and 45 percent of young women physicians were in primary care specialties in 1975. Almost 50 percent of all U.S. physicians, in contrast, were in primary care specialties in that year. With the exception of pediatrics, women physicians in the 1968 resident group were less likely to be in primary care than were men physicians.

Women were more likely than men, in the 1968 residents group, to be in psychiatry, anesthesiology, or "other" specialties. Men, on the other hand, were most fre-

TABLE 6

Specialty Distribution of All U.S. Physicians and of 1968 First-Year Resident Physicians in U.S. Programs, by Sex, as of December 31, 1975

Specialty	1968 First-Year Resident Physicians						All U.S. Physicians*	
	All		Men		Women			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
General/family practice	722	5.8	660	5.9	62	4.3	65,102	15.9
Internal medicine specialties	2,311	18.5	2,107	19.1	204	14.0	83,527	20.4
Surgical specialties	2,877	23.1	2,827	25.7	50	3.4	89,259	21.8
Pediatric specialties	1,015	8.1	725	6.6	290	19.8	27,433	6.7
Obstetrics/gynecology	745	6.0	645	5.9	100	6.9	26,205	6.4
Radiology	974	7.8	881	8.0	93	6.4	19,653	4.8
Psychiatry	914	7.3	769	7.0	145	10.0	28,661	7.0
Anesthesiology	633	5.1	504	4.6	129	8.9	15,559	3.8
Other specialties†	2,284	18.3	1,901	17.2	383	26.3	54,047	13.2
Total	12,475	100.0	11,019	100.0	1,456	100.0	409,446	100.0

* Data in these columns are from *Physician Distribution and Medical Licensure in the U.S.*, 1976 (3).
† Include cases where the 1975 primary specialty was unknown.

quently in a surgical specialty, despite the fact that opportunities to train in these specialties presumably have become more accessible to women in recent years. Men physicians were also more often found in radiology specialties than were women or than were physicians in earlier years. This shift may represent a response to the extremely high incomes which have been reported for radiologists in recent years when compared with other specialties (5).

The specialty distribution of 1968 first-year resident physicians, after seven years, indicates that concern about declining availability of primary care physicians is justified, and that within the near future general practice may disappear. However, the development and expansion of family practice residency programs during the 1970s is not reflected in the observed specialty composition of this cohort of physicians. Interest in family practice may counteract the decline in general practice among more recent medical school graduates.

Within the primary care specialties, pediatrics is increasing, proportionately, while internal medicine represents a decreasing proportion of primary care practice. The increasing numbers of women physicians are primarily responsible for this shift in emphasis—almost 20 percent of these women chose pediatric specialization. Availability of primary care services to the adult population may become a serious problem in the future if the decline in interest in these specialities persists.

Geographic Distribution

More attention has been devoted to geographic maldistribution of physicians than to specialty choices. A number of programs have been in existence for a decade or more which are oriented toward affecting location choices of young physicians. Although the lack of physician manpower in rural areas has been a central concern, more recently attention has focused on inner-city areas and disadvantaged populations.

The geographic distribution in 1975 of 1968 first-year resident physicians is presented in Table 7. Using the demographic country classification scheme adopted by the American Medical Association, it is

TABLE 7

Geographic Distribution of U.S. Population, Nonfederal U.S. Physicians and 1968 First-Year Resident Physicians, by Sex, as of December 31, 1975

Classification by County Population	1968 First-Year Resident Physicians						All U.S. Nonfederal* Physicians†		U.S. Population†	
	All		Men		Women					
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Possessions	74	0.6	65	0.6	9	0.6	3,317	0.9	NA‡	NA‡
Less than 10,000	39	0.3	37	0.3	2	0.1	2,289	0.6	4,536,400	2.1
10,000–24,999	214	1.7	202	1.8	12	0.8	8,921	2.4	14,867,100	6.9
25,000–49,999	446	3.6	426	3.9	20	1.4	14,391	3.9	16,787,900	7.8
Non-SMSA over 50,000§	558	4.5	523	4.7	35	2.4	19,186	5.1	17,077,700	8.0
Potential SMSA	226	1.8	207	1.9	19	1.3	5,977	1.6	4,279,500	2.0
SMSA 50,000–499,999	1,849	14.8	1,736	15.8	113	7.8	64,647	17.3	40,550,400	18.9
SMSA 500,000–999,999	1,453	11.6	1,315	11.9	138	9.5	47,911	12.8	26,756,300	12.5
SMSA 1,000,000–4,999,999	4,376	35.1	3,811	34.6	565	38.8	144,224	38.7	66,156,800	30.8
SMSA over 5,000,000	1,828	14.7	1,490	13.5	338	23.2	62,248	16.7	23,537,100	11.0
Other**	1,412	11.3	1,207	10.9	205	14.1	—	—	—	—
Total	12,475	100.0	11,019	100.0	1,456	100.0	373,111	100.0	214,549,200	100.0

* Data on county distribution of all U.S. physicians were not available in published form.

† Data in these columns are from *Physician Distribution and Medical Licensure in the U.S., 1976*, (3).

‡ Not available.

§ SMSA = Standard Metropolitan Statistical Area.

** "Other" includes all non-U.S. locations and address-unknown cases.

apparent that the physicians in this group are more urban oriented than were older physicians. While 3 percent of all U.S. physicians are located in rural counties with less than 25,000 population, only 2 percent of the 1968 resident group were located in these areas in 1975. Less than 1 percent of women physicians chose these very rural practice locations, and women physicians are disproportionately concentrated in the most populous urban areas. Sixty-two percent of women physicians in the 1968 group were located in Standard Metropolitan Statistical Areas with over one million population.

The decline in rural practice location decisions, due to declining interest for male physicians and to increasing numbers of women physicians with strong urban preferences, suggests that alternative modes of primary care delivery in rural areas may be necessary as the availability of physicians in private practice decreases. On the other hand, the increasing numbers of physicians in urban areas may indicate that inner-city residents will have more easily accessible services.

Conclusions

Examination of the career paths of all 1968 first-year resident physicians provides information on changes in physicians' career decisions which may be of use to both researchers and policymakers. The major points of interest which emerge from this study follow:

1. An apparent decline in interest in office-based practice is observed. Alternatively, or perhaps in addition, it may be that the time lag between initial residency and final career choices is greater than the seven-year period used in this study.

2. General practice is approaching extinction. In addition, primary care specialists continue to decline as a proportion of all physicians, while surgery, radiology, and other nonprimary specialties are increasingly frequent choices.

3. The decline in rural practice location choices has continued among this group of 1968 first-year resident physicians.

4. It appears that professional activity, specialty choices, and practice location patterns will change more rapidly because of changes in the sex-composition of the nation's physicians. As women become a larger proportion of all physicians in future years, attention to the impact of this shift will be necessary for policy formulation and for forecasting attempts.

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DATAGRAM

MCAT Scores and Academic Records of Natural Science And Humanities Majors Applying to Medical School, 1978–79

Discussion has occurred recently in several arenas regarding the value of attracting varied and broadly prepared applicants to schools of medicine. Often the intended focus of such discussions is applicants with humanities backgrounds. Therefore, it was thought to be instructive to look at candidates with humanities majors and compare some of their characteristics with those of the largest group, that is, natural science majors.

Of the applicants to medical school in 1978–79, 67.4 percent were natural science majors and 2.8 percent were humanities majors. These proportions have been similar in previous years. A comparison of the qualifications of these two groups of examinees, applicants, and accepted candidates is presented.

Table 1 presents grade-point averages (GPAs) for natural science and humanities majors for applicants and accepted students. On the average, humanities majors applied with slightly lower GPAs in both science and non-science areas but were accepted at a higher rate. This may imply that humanities majors do not feel the need to compensate in either science or non-science areas for not specializing in the "premedical sciences." It also suggests that admissions committees in the medical schools do not demand such.

Table 2 presents Medical College Admission Test (MCAT) score data for examinees, applicants, and accepted students by major. Humanities majors earned scores similar to natural science majors in Science Knowledge subtests

TABLE 1

Mean Grade-Point Averages for Humanities and Natural Science Major Applicants and Accepted Students to the 1978–79 Entering Class to Medical School*

Major	Science GPA	Other GPA	Total GPA
Applicants			
Natural Science (N = 22,517)			
Mean	3.29	3.42	3.33
S.D.	.46	.41	.41
Humanities (N = 963)			
Mean	3.25	3.34	3.28
S.D.	.47	.40	.39
Accepted Students			
Natural Science (N = 10,476)			
Mean	3.50	3.57	3.52
S.D.	.38	.34	.34
Humanities (N = 491)			
Mean	3.43	3.45	3.43
S.D.	.41	.35	.34

* Natural science majors include: chemistry, physics, biology, anatomy, biochemistry, biomedical science, botany, chemistry and biology, genetics, human biology, microbiology, neuroscience, nutrition, pathology, psychobiology, pharmacology, physiology, science (other biological), and zoology; humanities majors include: art, classics, English, foreign language, humanities, literature, linguistics, library science, music, philosophy, religion, speech and theater arts.

TABLE 2

Mean MCAT Scores for Humanities and Natural Science Majors for the Spring 1977 Examinees and 1978–79 Entering Class Applicants and Accepted Students*

Major	Biol	Chem	Phy	SP	SA:R	SA:Q
Spring 1977						
Examinees						
Natural Science (N = 21,487)						
Mean	8.07	8.11	8.00	8.11	7.98	8.02
S.D.	2.40	2.56	2.48	2.49	2.40	2.50
Humanities (N = 710)						
Mean	7.97	8.13	8.02	8.04	8.82	8.39
S.D.	2.38	2.47	2.44	2.48	2.21	2.40
Applicants						
Natural Science (N = 24,140)						
Mean	8.53	8.48	8.41	8.54	8.35	8.42
S.D.	2.25	2.56	2.39	2.37	2.25	2.41
Humanities (N = 985)						
Mean	8.44	8.51	8.50	8.45	9.07	8.79
S.D.	2.14	2.45	2.28	2.28	2.00	2.19
Accepted Students						
Natural Science (N = 11,193)						
Mean	9.42	9.61	9.39	9.59	9.08	9.29
S.D.	1.88	2.17	2.22	2.01	1.83	2.02
Humanities (N = 503)						
Mean	9.27	9.58	9.28	9.43	9.68	9.57
S.D.	1.82	2.00	2.10	1.89	1.58	1.75

* For definition of natural science and humanities majors, see footnote on Table 1. MCAT subtest and assessment area abbreviations are: Biol = biology, Chem = chemistry; Phy = physics; SP = Science Problems; SA:R = Skills Analysis: Reading; SA:Q = Skills Analysis: Quantitative.

in biology, chemistry, and physics and in Science Problems. They obtained appreciably higher ones in Skills Analysis:Reading and Skills Analysis:Quantitative. Although the average score for each major category and for each subtest was greater for applicants (than examinees) and still greater for accepted students, the changes for humanities majors and natural science majors are comparable.

Despite the fact that these two groups do not appear to differ appreciably in academic record and MCAT scores, they do differ in their rate of acceptance, which suggests that other factors influence admissions decisions. Humanities majors have a higher acceptance rate (50 percent) than natural science majors (45.7 percent). Further, the higher acceptance rate for humanities is observed in the case of both sexes. In the natural sciences, males have an acceptance rate of 47.0 percent and females 44.4 percent. In the humanities, males have an acceptance rate of 52.3 percent and females, 48.6 percent.

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DATAGRAM

1979–80 Enrollment in U.S. Medical Schools

The total number of medical students enrolled in U.S. medical schools rose to a record high of 63,800 in the fall of 1979. Although this reflects a 2.6 percent increase over 1978, it is the smallest increase in the last six years. Increases in 1977 and 1978 were 3.9 and 3.6 percent, respectively. While some of the increase in 1979 is due to the expansion in the size of the 1979 entering class, most of the growth can be attributed to positions filled through advanced placement.

A total of 16,930 students comprise the first-year class that entered in the fall of 1979, resulting in a 2.6 percent increase over the previous year. This increase derives from two factors. First, the expansion of available first-year places in the nation's existing medical schools provided 324 new spaces. Second, two newly accredited medical schools (the Universidad Central del Caribe in Cayey, Puerto Rico, and Oral Roberts University, Tulsa, Oklahoma) accommodated 105 new students, accounting for 24 percent of the increase.

Female medical student enrollment continues to increase as it has in the past six years. Total enrollment of women rose from 15,102 (24.3 percent of the total students enrolled) to an all-time high of 16,141 (25.3 percent). The total enrollment of women has grown from 9,661 in 1974–75 to 16,141 in 1979–80, a 67.1 percent increase. During the same period, the enrollment of men increased from 43,893 in 1974–75 to 47,637 in 1979–80, an increase of only 8.5 percent. First year enrollment of women rose from 4,162 in 1978–79 (25.2 percent of the first-year class) to 4,713 in 1979–80 (27.8 percent of the first-year class). This is the sharpest increase recorded in the past six years.

Enrollment figures do not support the conclusion that underrepresented minorities have been adversely affected by the Bakke decision. (The underrepresented minorities category in this study consists of blacks, American Indians or Alaskan natives, Mexican Americans/Chicanos and mainland Puerto Ricans.)

Underrepresented minority enrollment rose

TABLE 1

U.S. Medical School Enrollments for 1979–80

Racial/Ethnic Category	First-Year Enrollments*				Total Enrollments			
	Men	Women	Total	Percent of Total	Men	Women	Total	Percent of Total
U.S. Citizens								
White	10,505	3,754	14,259	84.2	41,779	13,075	54,854	86.0
Underrepresented Minorities								
Black	613	495	1,108	6.5	2,078	1,549	3,627	5.7
American Indian or Alaskan Native	47	16	63	.4	157	55	212	.3
Mexican American/Chicano	216	74	290	1.7	735	229	964	1.5
Puerto Rican (Mainland)	56	30	86	.5	179	104	283	.4
Other U.S. Students								
Asian or Pacific Islander	348	154	502	3.0	1,259	518	1,777	2.8
Puerto Rican (Commonwealth)	149	77	226	1.3	455	245	700	1.1
Other Hispanic	129	59	188	1.1	407	160	567	.9
Foreign Students								
Black	34	12	46	.3	115	43	158	.2
Other	120	42	162	.9	473	163	636	1.0
All Students	12,217	4,713	16,930	100.0	47,637	16,141	63,800†	100.0

* First-year enrollment includes new entrants and those repeating the initial year.

† Total includes 22 students from whom data were not available.

slightly from 7.9 percent of the total student body in 1978–79 to 8.0 percent in 1979–80. First-year enrollment of underrepresented minorities rose from 8.7 percent in 1978–79 to 9.1 percent in 1979–80. Compared with 1978–79, the 1979–80 first-year class has 236 fewer white males (2.2 percent less), 447 more white females (13.5 percent gain), 60 more underrepresented minority females (10.8 percent gain), and 44 more underrepresented minority males (5.0 percent gain).

Foreign student enrollment decreased slightly, continuing a trend observed over the past six years. Of the 1979–80 total medical school population, 794 (1.2 percent) students are non-U.S. citizens compared with 897 (1.4 percent) in 1978–79. Of the 1979–80 first-year class, 208 students (1.2 percent) were non-U.S. citizens compared with 228 students (1.4 percent) in 1978–79.

The sources of data for this study are Association of American Medical Colleges fall enrollment surveys. All figures reflect final enrollment and may differ slightly from earlier published material. Figures include repeaters and re-entrants to medical school.

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TABLE 2

First-Year U.S. Medical School Enrollments, Men and Women, 1974–75 through 1979–80*

	1974–75		1975–76		1976–77		1977–78		1978–79		1979–80	
	(114 Schools)		(114 Schools)		(116 Schools)		(120 Schools)		(124 Schools)		(126 Schools)	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Men	11,488	77.8	11,648	76.2	11,755	75.3	12,006	74.4	12,339	74.8	12,217	72.2
Women	3,275	22.2	3,647	23.8	3,858	24.7	4,130	25.6	4,162	25.2	4,713	27.8
Total	14,763	100.0	15,295	100.0	15,613	100.0	16,136	100.0	16,501	100.0	16,930	100.0

SOURCE: AAMC Fall Enrollment Surveys

* First-year enrollment includes new entrants and those repeating the initial year.

TABLE 3

Total U.S. Medical School Enrollments, Men and Women, 1974–75 through 1979–80

	1974–75		1975–76		1976–77		1977–78		1978–79		1979–80	
	(114 Schools)		(114 Schools)		(116 Schools)		(120 Schools)		(124 Schools)		(126 Schools)	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Men	43,893	82.0	44,401	79.5	44,811	77.6	45,821	76.3	47,111	75.7	47,637	74.7
Women	9,661	18.0	11,417	20.5	12,954	22.4	14,218	23.7	15,102	24.3	16,141	25.3
Total	53,554	100.0	55,818	100.0	57,765	100.0	60,039	100.0	62,213	100.0	63,800*	100.0

SOURCE: AAMC Fall Enrollment Surveys.

* Total includes 22 students from whom data were not available.

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DATAGRAM

Women Physicians on U.S. Medical School Faculties

A previous datagram (1) reported the finding that the participation of women physicians on 1975 medical school faculties was generally greater than the participation of male physicians relative to the numbers of each sex in graduating classes since 1951. The study has now been repeated for the 1980 faculty, again basing the faculty statistics on the Faculty Roster System of the Association of American Medical Colleges.*

The numbers of participants are shown in Table 1, and the academic fraction of each class is shown in Figure 1 for full-time faculty excluding instructors.

It is apparent that the trend toward relatively higher participation for women has continued. For the class graduating in 1969, for example, 12.7 percent of the women but only 9.8 percent of the men are now serving in faculty positions as assistant, associate, or full professors. In 1975, less than 2 percent of the class of 1969 (2.3 percent of the women and 1.7 percent of the men) had received faculty appointments at those ranks, though a greater number had been appointed as instructors.

In the aggregate, participation of women physicians on medical school faculties has gradually increased, reaching 10.1 percent in 1977–78 (2).

Women now make up around 29 percent of entering medical school classes, but it should not be forgotten that in population matters the time required to reach a new steady state is measured in generations. If the fraction of women among medical school graduates should reach 30 percent and level off there and if there is no change in the fraction joining faculties, the number of women on the faculty would continue to rise until the women from these classes begin to retire some 40 years later.

The fact that women physicians are represented relatively more heavily than men on medical school faculties raises a number of questions: Do these women have full-time appointments? Do they have regular academic appointments as assistant professors, associate professors, or professors? Are they equally well represented in the upper ranks?

The first two questions were answered in the affirmative in the 1975 report and continue to be positive, but the third question is not formulated with sufficient precision. At least some of the criteria for promotion are related to length of experience and thus to age. The rapid changes in distribution by sex of graduating classes in recent years have skewed the age-sex distribution of physicians: there are more

* The Faculty Roster System is supported in part by the National Institutes of Health under contract N01-OD-0-2121.

FIGURE 1

Proportions of men and women U.S. medical graduates (classes of 1940–1975) serving full time in all ranks on U.S. medical school faculties in 1980.

TABLE 1

Total U.S. Graduates, 1940–75, and Numbers of These Graduates on U.S. Medical School Faculties in 1980

			Graduates of Respective Classes on U.S. Medical School Faculties					
	Total U.S. M.D. Graduates*		Full- and Part-time, All Ranks		Full-time Only, All Ranks		Full-time Professors, Associate and Assistant Professors	
Year	Men	Women	Men	Women	Men	Women	Men	Women
1940	4,844	253	183	16	136	15	132	13
1941	4,995	280	205	9	168	6	160	4
1942	4,884	279	228	17	180	15	172	14
1943	4,982	241	485	20	397	13	389	13
1944	9,812	491	360	22	306	20	288	19
1945	4,874	262	446	22	372	17	351	17
1946	5,584	242	427	18	357	15	337	15
1947	6,047	342	413	19	344	13	325	13
1948	5,151	392	398	32	341	25	327	23
1949	4,482	612	362	74	297	61	280	57
1950	4,958	595	348	66	296	55	281	52
1951	5,667	468	382	37	317	30	299	26
1952	5,729	351	504	38	418	34	402	32
1953	6,305	363	521	34	437	32	416	30
1954	6,501	360	625	49	526	37	503	35
1955	6,632	345	704	52	591	43	571	40
1956	6,505	340	659	63	575	53	563	50
1957	6,466	330	689	58	573	49	557	46
1958	6,506	355	691	52	594	43	575	40
1959	6,490	370	752	60	630	46	611	44
1960	6,676	405	793	73	663	60	641	57
1961	6,640	354	799	46	673	41	634	40
1962	6,777	391	854	80	724	69	691	65
1963	6,860	405	814	69	683	58	658	49
1964	6,887	449	785	87	630	72	600	68
1965	6,906	503	859	98	747	86	719	81
1966	7,050	524	847	94	744	80	693	74
1967	7,160	583	876	103	750	80	705	70
1968	7,332	641	882	111	772	92	713	83
1969	7,452	607	953	101	818	86	733	77
1970	7,667	700	857	116	765	98	658	89
1971	8,147	827	850	152	763	132	633	102
1972	8,691	860	958	134	825	118	663	93
1973	9,467	924	871	126	780	109	570	84
1974	10,349	1,264	704	121	626	101	409	66
1975	11,008	1,706	508	104	440	90	219	51

* Graduation statistics are taken from Medical Education in the United States, 1978–1979. *J.A.M.A.*, **243**:852–853,1980.

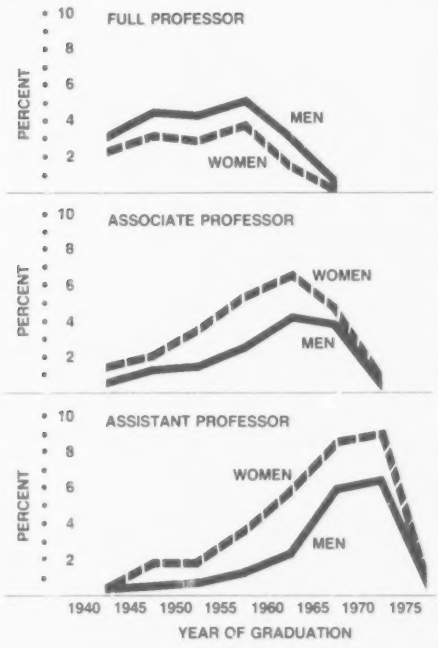

FIGURE 2

Proportions of men and women U.S. medical graduates (classes of 1940–1975) serving full time on U.S. medical school faculties in 1980, by rank and plotted by midpoints of 5-year intervals.

women in the younger age groups. It is not surprising, therefore, that there are relatively more women assistant professors (16 percent of all assistant professors) than full professors (4 percent of all professors) (2).

To take account of length of experience, analysis by graduation year and sex was applied to full professors, associate professors, and assistant professors separately. Because of the small numbers involved, data are aggregated in five-year intervals. The results of the analysis appear in Figure 2.

It is interesting that the modal graduation periods for both men and women on the 1980 faculty are the same: 6 to 10 years ago for assistant professors, 16 to 20 years ago for associate professors, and 21 to 25 years ago for professors. (These are greater than the typical periods required for promotion, because a person can remain in the associate professor or professor rank for many years.)

Relative to the available numbers of medical graduates, women are more strongly represented than men at the assistant and associate levels, but men are more strongly represented at the full professor level.

The differing participation levels of men and women at the various ranks and on faculties in general do not necessarily imply that there is discrimination in hiring (in favor of women) or in promotion (in favor of men) but may in part reflect differences in priorities and preferences on the part of the individuals themselves.

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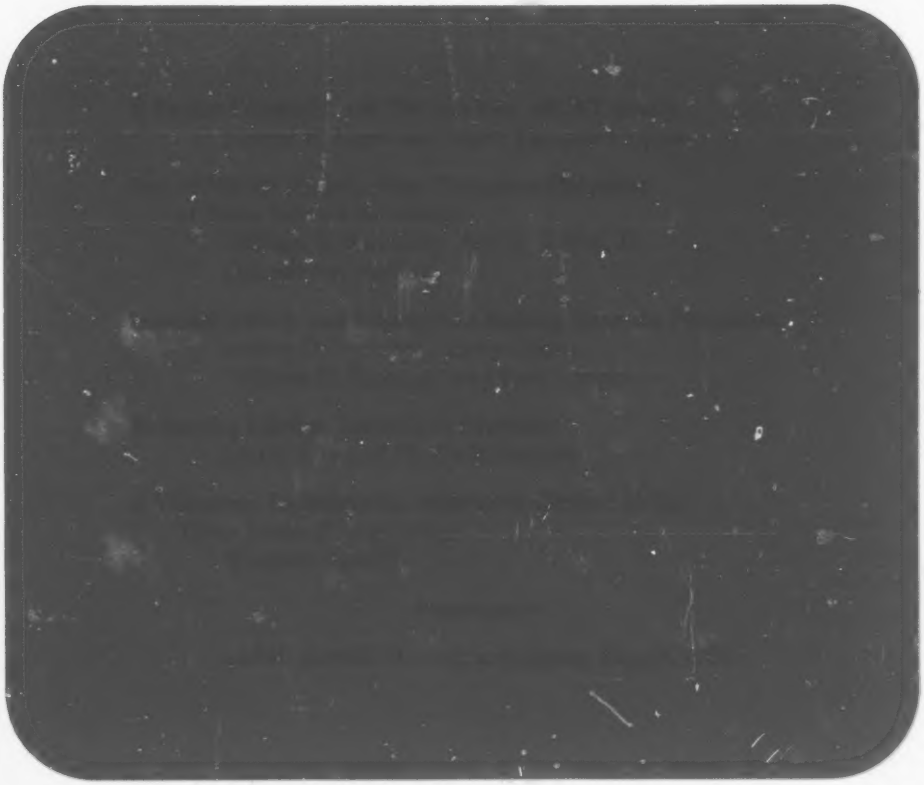

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A Factor Comparison of Old and New MCAT Scales

Robert F. Jones, Ph.D., and Maria Thomae-Forgues

Abstract—The old Medical College Admission Test (MCAT) and the New MCAT were compared by factor-analyzing the scores of a sample of 1,484 examinees who had taken both test batteries during 1976–77. Three common factors were extracted and interpreted. The first, a general science-quantitative factor, linked scales from both test batteries. A second factor, labeled verbal ability, characterized primarily two scales from the old test, Verbal Ability and General Information. A third factor, interpretation skills, was common to the two skills analysis scales of the new test. Specific variance for each subtest was also estimated by comparing the variance accounted for by these factors with the systematic variance indicated by the reliability. It appears that the old Quantitative Ability subtest measured unique skills which have not been incorporated into the new battery. Also the new Biology and Physics scores seem to provide specific information on knowledge in a particular discipline in addition to general science knowledge. Discussion centers on the implications of these data for the use of New MCAT scores in admissions.

Now that institutions are gaining experience with the New Medical College Admission Test (New MCAT), comparisons with the old test are inevitable. Of interest, of course, is whether the New MCAT will prove to be a stronger and more consistent predictor of medical school performance than the old examination. Other, direct comparisons between the two test batteries are informative, and two such studies have now been reported. The first is a correlation study by Givner and Hynes (1), and the second a factor analytic study by J. B. Molidor and A. S. Elstein reported at the Eighteenth Annual Conference on Research in Medical Education (RIME) of the Association of American Medical Colleges in 1979.

Dr. Jones is a research associate and Ms. Thomae-Forgues a research assistant in the Division of Educational Measurement and Research of the Association of American Medical Colleges, Washington, D.C.

Givner and Hynes examined the correlations between old and New MCAT scores for 66 repeat applicants to the University of Nebraska School of Medicine. These correlations generally were not very high. Particularly striking was the finding that the old Verbal Ability subtest correlated only .25 with the new Skills Analysis: Reading scale; likewise, the respective quantitative sections correlated only .37. The old Science Achievement subtest did show a relationship of .70 with the new science areas of assessment; but as the authors correctly noted, this demonstrates only about 50 percent of shared variance. They concluded on a preliminary basis that the New MCAT was assessing skills not measured by the old test. However, the size and representativeness of their sample may limit the generalizability of their findings.

Molidor and Elstein took a different approach. They conducted principal com-

ponents analyses on the old and new test batteries separately, using consecutive-year applicant pools to the Michigan State University College of Human Medicine. Results were informally compared. Both batteries yielded a two-factor structure; as the authors observed, this structure was more clearly defined for the old test than the new. The old MCAT was reduced to a verbal and a science-quantitative factor. The new scales clustered on a science dimension and a skills analysis dimension.

A factor analysis or principal components analysis used in this context, that is, in analyzing a small battery of achievement tests, should be interpreted with caution. The extraction of only one or two common factors is predictable, as is the finding that the first factor extracted accounts for a very large proportion of the variance. There is probably a general achievement factor that is present in many positively correlated achievement test batteries. It may be premature to conclude that all the meaningful information from these tests is summarized in the resulting common factors.

Classical theories of factor analysis subdivide the variance for any one test into three types: common, specific or unique, and error. "Common" refers to the proportion of variance a test shares with others in a battery, the degree to which it measures the same things as the other tests. "Specific variance" relates to skills and achievement each test measures uniquely. "Error variance" refers to the degree to which test scores fluctuate in an unsystematic fashion simply due to errors in the measuring process. Both the common and specific components of test scores provide meaningful information. The proportion of variance they account for together is estimated by the reliability of the test.

The suggestion that the New MCAT scales have significant unique components is supported by preliminary evidence of discriminant validity for the science areas of assessment reported by B. C. Deighton and co-workers at the 18th RIME conference. In addition, in the Michigan State study the variance accounted for by the common factors was significantly less than that which can be considered systematic (that is, not due to measurement error), only 56 percent in the case of Skills Analysis:Reading. It would seem useful and necessary to examine unique factors as well as common factors in any formal comparison of the old and new batteries.

The present study was devised with this point in mind. The aim was to include both test batteries simultaneously in a factor analysis so as to gauge the extent to which the variance for any one subtest is shared by any other in the old or new battery or is unique to that subtest. By including old and new scales in the same analysis, the comparisons among scales would be direct rather than inferred or speculative. Also by studying a single group of individuals who had taken both batteries, the authors attempted to confirm the preliminary results from the Nebraska correlational study with a much larger sample.

Method

A total of 2,969 examinees from the national pool who sat for both the last administration of the old MCAT in the fall of 1976 and the first administration of the New MCAT in the spring of 1977 were identified. This represents approximately a 67 percent increase in the size of the typical fall-spring repeater group, due to the special circumstances of instituting a new test battery. This particular population of test repeaters was chosen for study so that the time between test administrations was both standard and minimal.

Four well-known scales comprise the old MCAT: Verbal Ability (VA), Quantitative Ability (QA), General Information

(GI), and Science Achievement (SCI). Six scores are reported for the new test: Science Knowledge covering biology (BIO), chemistry (CHEM), and physics (PHY); Science Problems (SP); Skills Analysis: Reading (SA:R); and Skills Analysis: Quantitative (SA:Q). The Science Problems score is produced from problem-solving items used in computing the three science discipline scores (approximately one-third in each case) and, therefore, bears a spurious relationship to them. This score was not included in the factor analysis described below.

Correlation coefficients among the 10 scores for a random half-sample of the repeater population (n = 1,484) were first examined. This matrix, minus the Science Problems measure, was then factor analyzed using a principal axis solution. Values of R^2 were used to estimate the communalities. The initital solution was rotated according to a Varimax criterion (2). An oblique rotation was then performed by hand using procedures described by Thurstone (3). This process was repeated for the other half-sample. Results were nearly identical, and only the first set of analyses is presented here.

Results

Table 1 presents means, standard deviations, and intercorrelations for all 10 scales. The relationships between old and new scales tend generally to be stronger than those reported in the Nebraska study. One explanation for this may be differences in the range of scores; Nebraska's repeat applicant sample is likely to be more restricted than the group studied here. The strong relationships between the old Science subtest and the new science areas of assessment are as expected and replicate the Nebraska results. The new skills analysis scores, while showing moderate to strong relationships with the old Verbal and Quantitative Ability sections, are more substantially correlated with each other than their counterparts were in the old test. Further insight into these relationships was sought in the factor analysis.

Several orthogonally rotated solutions ranging from two to six factors were first examined. Three factors appeared to exhaust the common variance. This was confirmed later on a second half-sample. After inspecting plots of these factors, they were rotated by hand to a final oblique solution. The oblique factor loadings and estimates of common variance for each scale are included in Table 2. The first factor accounts for 60.9 percent of the variance and reflects obviously the strong science-quantitative component that underlies many of these scales. The second factor, accounting for an additional 11.7 percent of the variance, seems to tap a verbal ability dimension common to both the old Verbal Ability and General Information scales. A third dimension, explaining an additional 6.2 percent of variance, appears to be shared by the two new skills analysis scores and might be labeled "interpretation skills."

These three dimensions, similar to those found in the Michigan State study, together with their associated loadings listed in Table 2, illustrate clearly some of the differences between the old and new test batteries. Both batteries assess science achievement and quantitative skills. No area of assessment in the New MCAT seems to focus specifically on assessing verbal skills and general knowledge, except in a modest way the Skills Analysis: Reading subtest. However, the correlation of .66 found between the science-quantitative factor and the verbal ability factor is fairly high.

The New MCAT introduces assessment in the area of gathering, evaluating, and using information. These skills were not measured by any one subtest in the old MCAT, even by the Verbal Ability scale.

TABLE 1

Means, Standard Deviations, and Intercorrelations Among Old and New Medical College Admission Test Scales*

MCAT Scale†	Mean	S.D.	Intercorrelations								
			VA	QA	GI	SCI	BIO	CHEM	PHY	SP	SA:R
VA	500	96									
QA	558	96	.43								
GI	501	80	.75	.39							
SCI	538	98	.53	.66	.50						
BIO	7.6	2.32	.48	.51	.44	.71					
CHEM	7.3	2.43	.46	.61	.39	.75	.66				
PHY	7.4	2.32	.42	.59	.38	.68	.57	.68			
SP	7.5	2.38	.47	.63	.43	.76	.79‡	.82‡	.78‡		
SA:R	7.5	2.49	.59	.46	.53	.54	.57	.52	.48	.58	
SA:Q	7.5	2.62	.49	.59	.43	.66	.53	.66	.66	.71	.65

* Data are based on a 50 percent random sample of examinees who took the old MCAT in the fall of 1976 and the New MCAT in the spring of 1977 (n = 1,484).

† See text for explanation of abbreviations.

‡ These correlations are spuriously high due to item overlap in scoring (approximately one-third in each case).

TABLE 2

Rotated Factor Loadings for Old and New MCAT Scales-Oblique Solution

MCAT Scale	Factors*			Estimate of Common Variance	Reliability (KR20)	Estimate of Specific Variance
	I	II	III			
Old MCAT						
VA	.02	.64	.03	.77	.91	.14
QA	.54	.01	.02	.53	.90	.37
GI	−.01	.66	.06	.73	.79	.06
SCI	.68	.01	−.08	.82	.89	.07
New MCAT						
BIO	.51	.04	.14	.59	.82	.23
CHEM	.69	−.09	.03	.72	.86	.14
PHY	.63	−.09	.08	.63	.83	.20
SA:R	.22	.27	.42	.67	.76	.09
SA:Q	.52	−.01	.37	.75	.82	.07

* Percent variance accounted for by Factor I = 60.9; Factor II = 11.7; Factor III = 6.2.

Moreover, this third dimension is only weakly correlated with either the science-quantitative (.25) or verbal ability (.22) factors. Both skills analysis scores in the new test are complex variables, each loading highly on more than one factor.

As stated previously, comparisons between the old and new test need not be limited to an examination of common factors. The estimate of common variance explained by these factors is contrasted in Table 2 with an estimate of the reliability for each scale. To reiterate a point made earlier, the latter indicates the proportion of variance that is explainable, that is, not due to measurement error. The difference between these two figures is shown in the final column of Table 2 as an estimate of the proportion of specific variance.

It is evident from these figures that, even though the new test assesses quantitative skills, the old Quantitative Ability scale measured some unique skills that have not been incorporated into the new battery, most likely computational skills or specific knowledge of algebra and geometry. The science scores in the new battery, particularly Biology and Physics, include a unique component that accounts for up to one-fourth of the systematic or explainable variance. In contrast, performance on the skills analysis subtests can be explained for the most part by the three common factors which have been discussed: science-quantitative, verbal ability, and interpretation skills.

Discussion

The finding that the major link between the old and New MCAT lies in a general science-quantitative factor is not surprising. Development of the new test followed recommendations of an Association of American Medical Colleges national task force reporting in 1973 to the Medical College Admissions Assessment Program for more detailed assessment of science achievement and a revision of reading and quantitative ability sections to include more scientific and medicine-related topics. Of particular concern to that task force were the old Verbal Ability and General Information subtests, which, while perhaps less used by admission committees generally, were viewed as having the greatest potential for bias against ethnic and racial minorities. This objection seems to have been met in that none of the new scales, including the new assessment of reading skills, loads particularly high on the common dimension possessed by those old scales.

In this regard, the New MCAT may be considered to provide a more focused assessment than the old test. The change may be accompanied by an increase in predictive utility. The heavy emphasis placed in development on the content relevance of test items suggests that the test will be a strong predictor of medical school performance in the basic medical sciences. In addition, the new assessment of thinking and interpretation skills is expected to establish the test's value as a predictor of clinical performance. A determination of any increased utility for the new test can be made only when a broad range of local validity studies have been conducted. However, the preliminary evidence in regard to predicting basic science performance has been encouraging (4–7).

A constant issue facing admission committees is how best to use New MCAT information in their selection process. While there are common threads between the knowledge and skills measured by the old MCAT and those of the new test (for example, the general science-quantitative factor), one cannot simply attribute the characteristics of the old test to these new scales, particularly with respect to the new reading and quantitative sections. Similarity in nomenclature can be misleading; data here confirm that these tests measure quite different skills than did the old Verbal Ability and Quantitative Ability scales.

Molidor and Elstein offer useful suggestions in this regard. They warn against a simple averaging of the six scores, since this implies a disproportionate weighting of science knowledge and problems which may not be desirable. The reporting of six scores was designed to give schools greater flexibility in their use of test data for admissions and to develop a profile of the strengths and weaknesses of individuals. It was not proposed as an admissions scheme. Though empirical support for this detailed reporting of scores has been given (4) and data here confirm that unique information is provided by each score, future studies must continue to address the usefulness of this score-reporting system.

Averaging the four science scores, as Molidor and Elstein suggest, can produce a quick index of science achievement for gross screening purposes. Note that science problem-solving items are weighted dou-

ble in this method because of the unique scoring system. This can be avoided by averaging only the three discipline scores. Alternatively, the discipline scores might be weighted differentially in accordance with local emphases in the medical school curriculum.

Factor analysis itself cannot provide a single, definitive answer to the question of how New MCAT information can be used most effectively in admissions. This is a matter of empirical verification at the local level and depends greatly on the values placed on various educational outcomes at each particular school. Once a school has constructed reliable measures of criteria that reflect these values, appropriate weights could be developed for a variety of admissions data. Actuarial models for combining information, that is, computer-generated equations based on regression analyses, have been shown to be remarkably effective (8), although there is some resistance to their use. New MCAT data certainly will be useful when academic performance in medical school is being considered. By conducting local analyses, schools can find the best way to put the test score data in the service of their particular educational goals.

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DATAGRAM

Results of the NRMP for 1981

The number of U.S. graduates (USG) who enrolled in the National Resident Matching Program (NRMP) in 1981 was 524 more than in 1980 (1); 96 percent of the graduates enrolled in the matching program. The number who subsequently withdrew increased by one percentage point, and the proportion who were unmatched remained at 7 percent (Table 1). Among the North American graduates (NAG), the number of "fifth pathway" applicants decreased from 506 to 456; 350 participated in the match, and 83 percent were successful, compared with 92 percent of the Canadian graduates, 65 percent of the osteopathic graduates, and 61 percent of physician applicants. The number of graduates of foreign medical schools (FMG) who applied increased by 663. Of the 2,516 who applied, 785 were U.S. citizens. The percentage of FMG who matched decreased.

The number of positions offered in the match increased by 276; 168 more were offered in the generalist* specialties than in 1980 (Table 2). The overall filling of positions increased by 2 percentage points; USG filled 69 percent of the positions offered. Again in 1981 obstetrics and orthopedic surgery have the highest percentages of filled positions.

Seventy-seven percent of the programs that offered 88 percent of the positions in the match in 1981 attracted U.S. graduates, who filled 79 percent of the positions. Another 6 percent of the positions in these programs were filled by other applicants, and thus 85 percent of the positions in these programs were filled. The other 23 percent of the participating programs offered 12 percent of the positions in the match but did not attract any U.S. graduates. Only 20 percent of the positions were filled in these programs by other applicants.

Only 24 more USG entered family practice programs than in 1980, and the filling of available positions decreased by 1 percent. Internal medicine attracted 109 fewer USG than last year, and the percentage filling of positions decreased by 3 percentage points because of the increase in positions offered.

In pediatrics, obstetrics-gynecology, general surgery, neurosurgery, otolaryngology, anesthesiology, pathology, diagnostic and therapeu-

TABLE 1

Participation in the National Resident Matching Program in 1981

Category	U.S. Students		North American Graduates*		Foreign Graduates		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Applicants	15,496	100	1,143	100	2,516	100	19,155	100
Withdrew	1,791	12	407	36	853	34	3,051	16
Active Participants	13,705	88	736	64	1,663	66	16,104	84
Matched	12,724	93	548	74	872	52	14,144	88
Unmatched	981	7	188	26	791	48	1,960	12
Total	13,705	100	736	100	1,663	100	16,104	100

* North American graduates include graduating students from U.S. osteopathic schools; Canadian medical schools; physician candidates, that is, U.S. graduates who did not enter GME directly from medical school; and "fifth pathway" students, who are U.S. nationals who have completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship.

* "Generalist" specialties are defined as family practice, internal medicine, obstetrics, and pediatrics.

tic radiology, and flexible programs, both the numbers of positions and USG entering them were greater in 1981 than in 1980. In psychiatry, orthopedic surgery, and urology, the numbers of positions offered were decreased and the numbers of USG entering them increased with the result that the filling of these types of programs increased.

The distribution of matched USG among the various specialties decreased by 2 percentage points in internal medicine and increased by one in pediatrics and in the support specialties. The percentages of FMG who matched into programs in family practice, internal medicine, and general surgery increased, and decreases occurred in the percentages matched into the support specialties and flexible residencies.

This year there were an additional 57 positions in the medical, surgical, and support specialties that were offered as second-year positions in a sequence with categorical first-year positions in internal medicine or general surgery; 84 percent of them were filled, including all offered as medicine-neurology, ophthalmology, and radiology and 10 of 13 offered as medicine-psychiatry. The 17 positions offered as surgery-orthopedic surgery also were filled in the match.

Of the 981 unmatched U.S. graduates, the first choices of 13 percent were for programs in medicine, of 15 percent for obstetrics, of 20 percent for general surgery, of 15 percent for family practice, and of 4 percent for pediatrics; thus a total of 47 percent of unmatched students made a first choice in one of the generalist specialties, which is 6 percent less than in 1980.

Data that describe the trends in numbers of positions offered and filled by U.S. graduates and other applicants during the past several years were included in the 1981 *NRMP Directory* (2).

JOHN S. GRAETTINGER, M.D., *executive vice president, National Resident Matching Program; associate dean for graduate medical education, Rush-Presbyterian-St. Luke's Medical Center; and professor of medicine, Rush Medical College, Chicago*

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TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1981

Specialties	Positions Offered		Applicants Matched											
			U.S. Students			North American Graduates‡			Foreign Graduates			Total		
	No.	Percent*	No.	Percent		No.	Percent		No.	Percent		No.	Percent	
				*	†		*	†		*	†		*	†
Family Practice	2,370	13	1,727	14	72	60	11	3	71	8	3	1,858	13	78
Internal Medicine	6,129	33	4,327	34	70	191	35	3	381	44	6	4,899	35	79
Pediatrics	1,833	10	1,241	10	67	55	10	3	103	12	6	1,399	10	76
Obstetrics	1,008	6	810	6	80	56	10	6	54	6	5	920	6	91
Medical Specialties	1,032	6	533	4	52	18	3	2	17	2	2	568	4	55
Dermatology	(8)		(6)		(75)	(0)		—	(0)		—	(6)		(75)
Neurology	(74)		(24)		(32)	(0)		—	(2)		(3)	(26)		(35)
Ophthalmology	(27)		(14)		(51)	(0)		—	(0)		—	(14)		(51)
Psychiatry	(923)		(489)		(52)	(18)		(2)	(15)		(2)	(522)		(56)
Surgery	2,407	13	1,769	14	73	100	18	4	143	16	6	2,012	14	83
Surgical Subspecialties	431	2	356	3	83	15	3	3	8	1	1	389	3	88
Neurosurgery	(45)		(34)		(75)	(2)		(4)	(3)		(7)	(39)		(86)
Orthopedics	(250)		(237)		(94)	(7)		(3)	(0)		—	(244)		(97)
Otolaryngology	(52)		(39)		(75)	(1)		(2)	(1)		(2)	(41)		(78)
Urology	(84)		(46)		(54)	(5)		(6)	(4)		(5)	(55)		(65)
Support Specialties	1,672	9	878	7	53	22	4	1	60	7	3	960	7	57
Anesthesiology	(526)		(291)		(55)	(6)		(1)	(26)		(5)	(323)		(61)
Pathology	(574)		(244)		(42)	(7)		(1)	(11)		(2)	(262)		(45)
Physical Medicine	(105)		(37)		(35)	(0)		—	(12)		(11)	(49)		(46)
Diagnostic Radiology	(383)		(291)		(75)	(9)		(2)	(5)		(2)	(305)		(79)
Therapeutic Radiology	(84)		(15)		(17)	(0)		—	(6)		(7)	(21)		(25)
Flexible	1,449	8	1,083	8	74	31	6	2	35	4	2	1,149	8	79
Total	18,331	100	12,724	100	69	548	100	3	872	100	5	14,144	100	77

* Percent distributions of positions offered and filled among specialties.

† Percent filling of positions.

‡ See footnote Table 1.

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COMMUNICATIONS

Geographic Region, Size, and Program Type In Family Practice Residencies

Jolene K. Berg, M.D., and Judith Garrard, Ph.D.

Research focusing on residency education in family practice has grown steadily since the 1960s when residency programs in this specialty were first established. In the course of one such study (1), the present authors examined three programmatic variables: geographic region, size, and type of program. This paper provides definitions of these variables, describes the current distribution of family practice residency programs across each of these variables, and presents the raw data for use by other researchers.

Methods

In 1979 a questionnaire about psychosocial support in residency training programs was mailed to program directors of all family practice residency programs (N = 362) listed in the *Guide to Family Practice Residency Programs* (2). In addition to the primary research data, information about geographic region, size, and type of program was obtained. Complete data were available for 359 programs (99 percent). The data were examined by means of chi-square for statistical differences within and between these three variables.

Results

Four geographic regions, northeast, south, midwest, and west, as defined in the *NIRMP Directory* (3), were used for this study.* The highest frequency of family practice residencies was located in the midwest (33 percent), followed by the south (28 percent), northeast (21 percent), and west (18 percent).

Residency programs were divided into three categories by size, defined as number of first-year residency positions available: small (two to four first-year positions), medium (five to eight positions), and large (nine or more positions). The authors determined size categories based on the frequency distribution of all residency programs. Thus, 29 percent of family practice residencies were small programs, 52 percent medium, and 19 percent large. The program sizes which occurred most frequently included programs with six (n = 108), four (n = 95), eight (n = 46), or 12 (n = 28) first-year residency positions. It was assumed that number of positions available accurately reflected size of program since most first-year residency positions in family practice were filled (4).

The third program variable, type of program, used definitions of program structure set forth by the American Academy of Family Physicians (5). The five program types, together with the percentage of residency programs in each, are described as follows. There are three types of community based programs: those based in a community hospital without university affiliation (14 percent), those based in and administered by a community hospital but having a formal affiliation with a university or medical school (50 percent), and those based in a community hospital but administered by a university or medical school (15 percent). The other two types of residency programs are those based at and administered by a university or

This study was supported in part by National Institute of Mental Health grant MH-05921-28 for psychiatry undergraduate training and in part by the Department of Family Practice and the Department of Psychiatry, University of Minnesota.

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* A complete list of states included within each geographic region can be obtained from the senior author.

medical school (16 percent) and those administered by the military (5 percent).

The three program variables do not function independently. As shown in Table 1, residency programs were not evenly distributed throughout the four geographic regions ($p < .05$). Most of the small (35 percent) and medium (35 percent) programs were found in the midwest, whereas most of the large programs were in the south (41 percent).

Size of program and type of program also showed a significant difference in the distribution of programs ($p < .0001$). Sixty-one percent of small programs and 50 percent of medium programs were community based-university affiliated. The majority of large programs were either university based (34 percent) or community based-university affiliated (34 percent).

Finally, type of program and geographic region also showed a distribution that is statistically significant ($p < .0001$). In this case, the largest percentage of programs in the northeast (56 percent), midwest (63 percent), and west (48 percent) are community based-university affiliated. The programs in the south are more evenly distributed among three types: community based-university affiliated (32 percent), university based (26 percent), and community based-university administered (24 percent).

Residency programs can be characterized not only according to the three individual programmatic variables described initially or by paired combinations of the variables as above but also by many other combinations. For the convenience of the reader who wants to pursue other questions related to geographic region, size, and program type, the data in Table 1 are given by numbers of programs in each cell rather than by percentages.

Discussion

While the three program variables described in this paper do not explain all of the variation among family practice residency programs, these variables are objective, easily measured, and representative of some basic program differences. The numbers reported in Table 1 are expected to change as new programs are developed and others are revised; however, it is expected that the usefulness of these three program variables will not diminish.

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A Model for Medical Care in Underserved Areas

Maurice A. Mufson, M.D., and Donald E. Melnick, M.D.

West Virginia stands out as medically underserved (1). Marshall University School of Medicine, a new community-based medical school in Huntington, West Virginia, aims to improve the number and distribution of physicians in West Virginia through active involvement of its faculty and residents in primary care delivery. To meet these goals, the faculty of the Department of Medicine established an outreach program with National Health Service Corps (NHSC) internists practicing in rural clinics by organizing inpatient services of patients from the combined practices of the department and the NHSC at centrally located community hospitals. The organization of the inpatient service under this outreach program may serve as a model for the establishment of similar programs at other medical schools located within reach of NHSC sites.

Organization

The Marshall University School of Medicine utilizes two community hospitals in Huntington for its teaching and clinical programs. For the purposes of engaging in the private practice of medicine, the 18 full-time members of the Department of Medicine are organized as a practice group and have medical staff appointments at both community hospitals. The faculty medical group provides primary and specialty internal medicine care for patients admitted to these hospitals from its practice, referred by other physicians, or admitted from the emergency rooms of the hospitals.

Six NHSC physicians, who are board certified or qualified internists, staff five primary care clinics located between eight and 35 miles from Huntington. Prior to the initiation of the outreach program, they admitted patients from their individual practices to the hospital and separately provided all daily medical care. Because their clinics are remote and reachable only by secondary roads and because physicians have disparate clinic schedules, the NHSC physicians could not make rounds comprehensively for each other. This necessitated their driving to the hospitals usually more than once a day to provide medical care to their inpatients and to unassigned patients admitted from the hospital emergency rooms. To care for a relatively few inpatients, they frequently had to interrupt full clinic schedules. Also they were often on night call.

The outreach inpatient service now includes the combined inpatient services of the department and NHSC faculties. The teaching team on the outreach inpatient service consists of an attending physician, either a department faculty member or a NHSC physician, junior and

Dr. Mufson is professor and chairman, Department of Medicine, Marshall University School of Medicine, Huntington, West Virginia, and Dr. Melnick is an assistant professor and section chief of general internal medicine in that department.

TABLE 1

Number of Residency Programs (n = 359) in 1979 Distributed by Geographic Region, Size, and Type of Program*

Type of Program	Northeast (n = 76)			South (n = 101)			Midwest (n = 119)			West (n = 63)		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Community based (n = 51)	7	10	1	3	6	1	3	7	0	6	5	2
Community based—university affiliated (n = 179)	18	21	4	9	17	6	22	42	10	14	12	4
Community based—university administered (n = 54)	0	1	3	5	13	6	8	10	3	0	5	0
University based (n = 59)	4	3	3	2	11	13	3	4	6	0	8	2
Military (n = 16)	0	0	1	0	6	3	0	1	0	0	3	2

* Statistical comparisons of these three program variables show the following paired differences: geographic region by program size: chi-square = 12.75, df = 6, $p < .05$; program size by type of program: chi-square = 37.09, df = 8, $p < .0001$; type of program by geographic region: chi-square = 55.97, df = 12, $p < .0001$.